REPORT RESUMES

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LANGUAGE ABILITY IN THE MIDDLE GRADES OF THE ELEMENTARY SCHOOL.
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THE OBJECTIVE OF THE REPORT WAS TO INVESTIGATE AND EVALUATE CHILDREN, K-6, IN LANGUAGE DEVELOPMENT--ITS USE, CONTROL, AND EFFECTIVENESS IN ORAL, WRITTEN, AND READING COMMUNICATION. THE STUDY WAS ALSO CONCERNED WITH DEVELOPING FUNDAMENTAL METHODS OF ANALYSIS TO AID THE SCIENTIFIC STUDY OF CHILDREN'S LANGUAGE FOR THE FUTURE. THE SAMPLES OF LANGUAGE WERE DRAWN FROM 338 PRIMARY SCHOOL CHILDREN AT REGULAR INTERVALS OVER A 4-YEAR PERIOD. TWO SUBGROUPS, REPRESENTING HIGH AND LOW LANGUAGE PROFICIENCY, WERE SELECTED FROM THE TOTAL GROUP. THE CONTROLLED INDIVIDUAL INTERVIEW SITUATION WAS IDENTICAL FOR ALL SUBJECTS. DATA INCLUDED RECORDS OF THE SUBJECTS' SPEECH, WRITING, READING, AND LISTENING AND INFORMATION ON HEALTH, MENTAL ABILITY, SOCIOECONOMIC STATUS, SCHOOL ACHIEVEMENT, AND SCHOOL ATTENDANCE. IN THE FIRST PHASE OF THE STUDY THE MOST IMPORTANT ACHIEVEMENT WAS THE ESTABLISHMENT OF THE OBJECTIVE METHODS OF ANALYSIS. BY COMBINING THE CONCEPT OF A SEMANTIC SYNTACTIC UNIT WITH PHONOLOGICAL METHODS OF SEGMENTATION, AND BY IDENTIFYING AND DEALING WITH THE NONCOMMUNICATIVE ELEMENTS, THE MAZES, A NEW AND USEFUL METHOD OF LANGUAGE ANALYSIS WAS SHAPED. IN THE FIRST 4 YEARS OF SCHOOLING, THE SUBJECTS SHOWED NOTABLE INCREASE IN FLUENCY, EFFECTIVENESS AND CONTROL, STRUCTURAL CONTROL, CONVENTIONAL USAGE AND GRAMMAR, COHERENCY THROUGH THE USE OF SUBORDINATION, TENTATIVE THINKING THROUGH THE USE OF PROVISIONAL AND CONDITIONAL STATEMENTS, READING AND WRITING, AND CONTROL OF MAZES, AND SHOWED A POSITIVE RELATIONSHIP AMONG THE LANGUAGE ARTS. (GC)

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LANGUAGE ABILITY
IN THE MIDDLE GRADES
OF THE ELEMENTARY SCHOOL

Final report to the United States Office of Education, Department of Health, Education, and Welfare on a research project supported with funds supplied from a contract between the Office of Education and The Regents of the University of California.

March 1, 1961

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I. INTRODUCTION

PURPOSES OF THE INVESTIGATION

The research reported in this monograph is a study of language used by children in the kindergarten and first six years of elementary school with special emphasis on their development in grades 4, 5, and 6. It is concerned with their use and control of language, their effectiveness in communication; and with the relationships among their oral, written, and reading uses of language. It is one part of a longer study covering the same subjects throughout the elementary and secondary school years.

The study is also concerned with developing fundamental methods of analysis which will aid the scientific study of children's language and with locating significant features of language worthy of further study;

. . . Can definite sequences in language development be identified?

. . . Just as in physical development, are there predictable stages of growth in language?

. . . How do children vary in ability with language and gain proficiency in using it?

These are the major questions forming the purposes and dimensions of this research. They are important questions because of the symbolic nature of language.

THE SYMBOLIC NATURE OF LANGUAGE

A fundamental difference between the animal and the human world is linguistic. Animals can use and understand signs; they cannot cope with symbols. A growl, a call, even a green traffic light--signs like these, directly tied to a concrete situation, can take on meaning for animals as well as for human beings. Symbols, however, are instruments of complicated thought. They are not necessarily tied to the immediate situation, for by means of symbols human beings can allude to objects or concepts even in their absence. The language human beings use for discourse is therefore, a system of arbitrary forms (names, symbols) to designate concepts. The system can be enlarged to name new concepts, e.g., camouflage in 1918, jet plane in 1960. Responses to a linguistic symbol in the system is contingent upon the symbols with which it is combined. For instance, in English-speaking communities, human response to the symbol crop differs in the two following sets of utterances because of the accompanying symbols:

The stone stuck in the bird's crop.

She carried a riding crop in her hand.

Go away!

Do not go away!

The signs used by animals never become language for discourse because animals are incapable of separating the signs from the particular concrete situations in which the signs are embedded. No evidence of animals having made the leap from signs to symbolic language, to words freed from situations and arranged in systems of semantic contingencies, has ever been verified.[1] Human beings use signs, of course, but they also use symbols. Without symbolic language there would be no formation of concepts, no dominance of abstract knowledge over concrete knowledge. Without symbolic language, there would be among men no civilization, no passing on of cultures.

The definition of language adopted for this research is one, therefore, which views translating of experience into systems of symbols as a basic and uniquely human activity. At the same time, a definition of language must also acknowledge that language used for communication is *learned*, an acquired cultural function rather than an instinctive behavior. Sapir's definition (27:8) includes all these considerations: "Language is a purely human and non-instinctive method of communicating ideas, emotions, and desires by means of a system of voluntarily produced symbols." The acquisition of symbolic language and the development of proficiency with it constitute, therefore, a significant problem for educational research.

For children acquisition of language is more than a passive process of association. Until the day she learned *water* as a symbol and thereby *disassociated it from any particular wetness*, Helen Keller lived the life of a gifted animal using signs. On that day, in a spectacular leap, she extended her limits to the mental horizon of the human family. Symbolic language, in childhood as in adulthood, is a highly active form of exploratory and adaptive behavior without which survival, though still possible, would be on the animal level. This research, therefore, focuses on the development of language as a basic exploratory and adaptive behavior used by human beings for survival, self-expression, and communication.

GUIDING THEORY OF THIS RESEARCH

This Study of Language Will Deal with Two Kinds of Meaning.

Linguistic research in the past has usually emphasized phonology. In such investigations, the linguist avoids considerations of meaning (in the usual sense of the word). The research linguist is usually concerned with what he calls differential meaning. He feels that referential meaning becomes confused with all the other systems of culture. He wants to describe the structure of language in its own terms; only then does he care to consider how these linguistic patterns relate to other systems of the culture.

On the other hand, some scholars have maintained that insight into the character and function of human speech is not possible if language is viewed with such a degree of objectivity. They believe that a language is not simply a system of forms but rather that the words and rules which make up a language .. really exist only in the act of connected speech. "Language must be looked upon as an *energeia* rather than as an *ergon*. It is not a ready-made thing but a continuous process; it is the ever-repeated labor of the human mind to utilize articulated sounds to express thought."[1a]

These latter scholars point out that in the past all complex facts were thought to be an accumulation, an aggregate of simple data. Modern Gestalt psychology, they assert, has criticized this conception, opening the way for a view of language as "an indissoluble unity which cannot be divided into the two independent and isolated factors, form and matter. . . . Modern linguistics is not interested in the nature of sounds but in the semantic function."[2] But this, again, is a position too far on the side of semantics and too antagonistic to structure. Significance is conveyed by linguistic forms and unless a speaker or writer can handle the forms adequately, he cannot express or understand "significance." Consequently this research will emphasize language both as a means of communication and as a formal system of sounds or markings. Analysis of both semantic and structural meaning will receive attention. Content and form will both be considered important to effective communication, and techniques of research using both will be employed.

A Close Relationship Exists between Language and Intelligence.

Proficiency with language and general intelligence, when probed quite deeply, nearly always represent two facets of the same energy.[3] In most instances people express intelligence in the manner of the most successful subjects in Warden's research (32). In learning to trace (with a stylus) a maze they could not see, three groups of his subjects achieved successful mastery with a varying average number of trials:

those who depended upon the kinesthetic "feel" required 124 trials
those who depended upon visual memory required 68 trials
those who verbalized the details ("right, 3 times," etc.) 30 trials

Similarly language enables human beings to find more efficient solutions for most of the problems they meet in our culture. Language and intelligent problem solving appear to be interrelated.

It may be, as Davis (8) contends, that the present curriculum in our schools is too exclusively verbal. However any reduction of emphasis upon language in school activities must be questioned. Power over language is power over problem solving--and vice versa. To be sure, the study of language in the schools is sometimes an example of means separated from ends. For that reason it is perhaps important to make clear that in this monograph the terms verbal learning and proficiency with language are not here intended to imply any separation between thought and expression. Glib and superficial uses of words do not contribute to the solution of real problems.

Language Growth Depends Upon a Complex of Factors.

The development of proficiency with language depends upon an active approach to experience. This expanding control of language depends in turn upon the relation between the physical-biological being and his environment. The child who is acquiring linguistic skill must have vitality and health; he must also have an environment which fosters exploration, confidence and the use of language. Thus language development is affected by numerous factors, all varying simultaneously and in complex interrelationships. In the interests of establishing a guiding theory for this research, however, some of these factors have been identified tentatively. An attempt here has been made to list, in the order of their presumed importance, those biological and environmental factors contributing most prominently to language development:

Environmental Factors

... security in relations with parents (or parent surrogates) and other authority symbols

... degree of facility in family use of language (usually, but not always, this factor will vary in the same direction as socio-economic status)

... amount of language heard and used in the family (conversation, stories, table talk, etc.)

... variety of experience including much interaction with other people and opportunity to verbalize this experience

... encouragement and opportunity for self-expression, not only in language but in other ways also

... adequate balanced diet (over a period of time)

... sufficient rest (over a period of time)

... instruction that focuses attention on the principles of effectiveness in language. (Such instruction would occur as much as possible in problem situations involving the child's interests and drives.)

Biological Factors

... glandular balance and total biological homeostasis

... energy (rate and balance of metabolism?)

... physical facility in speech production

... motor controls of speech organs

... visual acuity

... hearing acuity

... tactile acuity

... immunity to disease

It is possible, also, that nervous systems vary biologically in adequacy and in capacity to integrate electro-physical nerve impulses into those patterns by which perceptions become transformed into symbols. Whether or not such variations at the physical level do exist, one can agree that regardless of biological endowment, positive changes in the environmental factors listed above should contribute to improved language skill. Children with the most fortunate combination of both biological and environmental factors should develop controls over symbolic language earlier than children with less fortunate combinations of these factors.

Language is a Means of Adjustment.

All living is a process of adjustment, and language is one means by which individuals satisfy needs and accommodate frustration. Obviously language cannot dispel hunger or sub-zero weather. But since Cro-Magnon Man, the race has had sufficient control over the physical environment to make possible a shift from biological to cultural evolution. With the advent of language, social evolution became possible, an evolution that is much more rapid than biological evolution.

In cultural matters, therefore, where symbols occupy a central position, language is a common means of adjustment, so much so that a child who is isolated or overly protected may acquire only the lowest levels of language skill. Language develops in situations where individuals feel a need to express themselves and seek to be understood. (The reverse of this situation, also, holds true: language power can increase in situations in which an individual has a deep interest in receiving communication, either through listening or reading.) This would mean that children who are, for whatever reason, much alone or who play with only one other child such as a twin, will develop less skill in language than those who have genuine language interaction with other children and adults.

Reciprocal reinforcement of language is an important form of adjustment to the social environment.

Language Proficiency Develops Through a Sequence of Attainments.

Increasing power over language is a series of developing controls of meaningful forms. For instance the ability to handle pronouns according to convention; the use of subordination instead of coordination to show relationships more adequately; the accurate and consistent use of verb tense; the exact use of relational words (_until_, _although_, _in spite of_)--all these and more, it is believed, develop earlier in some children than in others. The rapidity with which these attainments occur and the order in which they occur among individuals will vary, but a general picture of the situation deserves to be revealed empirically. Through research, base lines may be charted for more effective instruction, and for individual children the relative stages of growth can be determined.

Which of these language attainments will appear early and which ones late? Their order, presumably, will be conditioned by the requirements of language situation as well as by the successful combinations the speaker has already mastered. Regressions will occur and previous accomplishments will require relearning in the setting of new, more complicated expressions. Very likely, also, the order and duration of these stages of growth will vary with individuals. No precise formula can be imposed on this development of language power, but an accurate description should reveal order and pattern rather than obscure accident.

Instruction Can Increase Language Proficiency.

Although instruction cannot very far transcend maturation, it can increase language power and prevent dislocations of language development.

Just as the influence of the home facilitates or retards the child's development of language, so can the influence of the school be favorable or unfavorable. Not only can learning be cleared of unrewarding obstacles, it can also be made more efficient, effective, and permanent. Particularly important is a curriculum which does not go against the grain of the child's readiness for the learning of language. And almost in the same breath, it is important to say that instruction should not underestimate the child's readiness to learn a new skill. When children in an arithmetic class cut cardboard pies into thirds and fourths, they learn the symbols of fractions more efficiently, with more understanding, than by a purely verbal presentation. Similarly, good methods of language instruction should increase an individual's ability to command words.

School Attendance and Social Interaction are Related to Language Proficiency.

Through making himself understood by others and through imitation, the child elaborates basic patterns of syntax he has already learned before entrance into school. Those children who have relatively little interaction with adults or other children have less need to make themselves understood; they have less experience with the elaboration of language patterns known to children who have an active speaking life. Records of school attendance will be of interest in this respect, for they should have a relation to interaction. Whether willing attendance at school is a concomitant, cause or result of language skill is not, however, a question for the present investigation. Important, also, will be indices of the child's social interaction.

Language is Related to Socio-economic Status and Home Environment.

As previous research has shown socio-economic status will be assumed to show a positive relation to language, and the extent to which a child utilizes his linguistic abilities will be influenced by his home environment.[3a] His home environment will likewise have a notable effect upon his learning of correct pronunciation, good usage and distinct speech.

All Symbolic Language Varies in the Same Direction.

Finally this research assumes for its guiding theory that a positive relationship exists among the various aspects of language--speaking, writing, reading, and listening.

RELATED RESEARCH

The extensive study of children's language has been reviewed in a number of publications. The research on language development, primarily centered in the pre-school years, has been presented by McCarthy (18). The Encyclopedia of Educational Research includes additional studies on the school years (9). The research in relation to curriculum, with emphasis upon spoken language, is reviewed by Anderson (1). Leopold has published a Bibliography of Child Language (16). The social aspects of language are emphasized in Bossard's summary and list of research (3). Smith presents a selective list of research on language in relation to child development (28).

Despite the difficulties of defining terms in traditional English grammar, several studies have been concerned with parts of speech. Waddle (31) found that personal pronouns, relative pronouns, as well as subordinating and connecting words are acquired late and with difficulty. Markey (19) devotes two chapters to the development of the use of personal pronouns, finding that at first symbolic development is centered around the self, and later extends to include others. Zyve (34) recorded the conversations of third grade children during a 15-minute story period for about three months using two methods of tabulation and obtaining strikingly different results. Nouns are 51 per cent of the number of different words used and only 15 per cent of the total number of words. Verbs represent 22 per cent of the number of different words used and 27 per cent of the total number of words. The pronouns also show a striking difference when tabulated by the two methods as they equal only 1.5 per cent of the number of different words, 17.2 per cent of the total number of words. Like the nouns, the adjectives show a decrease, but the adverbs, prepositions and conjunctions all show relative increases when considered according to the total number of words used. Conjunctions and prepositions appear late and increase only slightly in relative numbers.

The incidence of parts of speech has also been investigated by Nice (23) who was interested in the changes occurring with increasing age. She found striking agreement in the proportion of the various parts of speech at different ages. Comparing the conversation of older children (ages three to ten) with that of a thirty-month-old child she found a relative decrease in nouns, adjectives and exclamations and a decided increase in verbs, pronouns, prepositions, and conjunctions. This indicates that children move increasingly toward expressing modification, elaboration, and relationships.

Nice also outlines the various stages in sentence formation, beginning with the single word stage when the child is from four to twelve months of age. The last stage in Nice's sequence characterizes many of the subjects in the present research. This is the complete sentence stage, which appears at about four years and consists of sentences of from six to eight words, characterized by greater definiteness and complexity, as shown by an increased use of relational words. At this stage the relatively few inflections of English have been practically mastered and the majority of sentences are complete. Nice's arrangement of sequences leads to the point at which the present research begins. Smith (29) adds to the picture of developing maturity, concluding that with increase in age occurs an "increasing tendency towards the use of longer and more complete sentences and a decrease in the proportion of simple sentences to complex and compound sentences." One of Nice's most helpful contributions is her evidence that an hour's record can serve almost as well as that of a whole day in representing a child's skill in speech.

The uses children have for language is one part of the present research. Among studies of the functions of child language, one by Rugg, Krueger, and Sondergaard (26) evolves the following categories of classification, five of which also appeared in the present research (those italicized occur in both):

self assertion
self deprecation
social consciousness
verbalized perception
linguistic experimentation
dramatic play
questions
relational thought
statements of fact
answers of "yes" and "no"

The large percentage--40.8--in the self-assertion category, supports Piaget's (25) reports of the young child's egocentricity. Other studies (17), however, find much more socially-directed expression among the functions of children's language. Evidently the situation from which a language sample is drawn affects the results in any investigation of function. In the present research, for instance, the situation did not provide an opportunity for the self-assertion classification.

The writer or speaker who uses a large vocabulary may exhibit a more diversified style than one who restricts himself to a small vocabulary. Various methods of determining verbal diversification have been used. One of them, the type-token ratio (TTR), as described by Johnson (13), provides a direct measure of diversification. The TTR is the ratio of the number of different words (types) to the total number of words (tokens) in the passage. Chotlos (6) studied the writing of grade school children between the ages of eight and twelve to discover whether or not children with high I.Q. show the greatest verbal diversification. On the average the written material of the more intelligent children contained a larger proportion of different words than did the written material of the children with low I.Q.'s. There were, however, many individuals who did not conform to the pattern.

Although spoken language is particularly important in the primary grades, writing is also an essential part of this study. Studies of children's written language find the proportion of simple sentences decreasing steadily and the proportion of complex sentences increasing with chronological age (2, 15). Adverbial clauses of cause, condition and concession appear late because they involve relationships, probably necessitating logical thinking of a more difficult type than, for instance, noun clauses or adverbial clauses indicating when. Heider and Heider (11) studied the relative frequency of simple, compound, complex and compound-complex sentences in compositions written by children between the ages of eight and fourteen years. The proportion of simple sentences declined with age and more intricate sentence patterns characterized about three fourths of the fourteen-year-old writers' products.

Studies of children's errors in usage and grammar have called attention to the troublesomeness of verbs. Charters (5) presents a list of children's basic errors. He noted that 40 per cent of the errors made by the children in his study were in the form of fifteen common verbs: see, come, run, write, begin, break, lie, do, go, give, take, wring, sing, and sit. The point of difficulty proved to be chiefly the confusion of the past tense with the past participle.

Watts (33) is concerned with language as it reflects mental development. He reviews research by English and American workers and includes his own investigations. His work is notable for the ingenuity of the methods he has devised for revealing principles of genetic sequence.

II. RESEARCH DESIGN AND PROCEDURES

Design of the Research, a Brief Overview.

This research is based on a developmental design with the hypotheses and methods subject to modification during the course of a continuing study. The initial subjects are a representative group of 338 primary school children, and at regular intervals over a period of four years, comparable samples of their language have been collected.[4] From this evidence significant features worthy of description and analysis have been identified, and at yearly intervals the degree of development or change in these features has been charted.

The samples of language have been drawn from a controlled individual interview situation identical for all subjects. In order that other research workers might use the same procedures for purposes of further application, verification or refutation, the data have been analyzed and described by methods which allow for repetition. Wherever applicable and appropriate, standard procedures of quantitative and statistical description have been used. New methods have been carefully described. Thus it is possible to present the status of the subjects' language ability at four equally spaced periods of time. Whether one is interested in normative data for the group or in changes occurring to individuals, the data will provide answers.

In addition to the large representative group of subjects, two special subgroups have been selected from the total sample. These two subgroups consist of subjects representing extreme deviations from the mean of the total sample.[5] In the special group ranking extremely high in language proficiency there are 30 subjects; in the extremely low group there are 22 subjects. For these two special groups more extensive data have been gathered and analyzed.

Although this design includes attention to descriptive and normative data, its purpose is also to trace language development and to determine predictive factors. Consequently special attention has been given to the consistency of individual performance and the position of the individual within the total group. Thus the design has a triple focus--the total group, two special subgroups, and all individuals within the study.

Limiting Factors

By directing attention solely to the structural elements of language, one kind of value might be revealed. This advantage, however, could be realized only at the expense of questions about language development in relation to meaning.

By directing attention solely to the structural elements of language, a research worker can avoid one kind of danger. The cultural, psychological, and sociological factors in the semantics of language can easily dissipate the clarity of the findings. Yet, to separate language from its function as symbolic thinking and communication also encounters dangers of limitation. It has been necessary, therefore, in this study, to choose carefully among the possibilities both in the grammatical meanings that are signalled by structure and the lexical meanings that are signalled by semantics. This is a problem of the inclusiveness of research design, and the choice has been made in favor of both the differential and referential aspects of language.

A more restricting kind of limitation is to be found in the sampling of the subjects' language. Ideally, many different examples of language procured under various situations would be desirable. In the present research, considerations of cost and time limited the data on oral and written language to single yearly samples. Reading was more completely studied by several tests each year and a record of voluntary reading.

For some aspects, requiring particularly meticulous and expensive computation and analysis, the two subgroups representing the extremes of linguistic ability have been studied and contrasted in lieu of the entire sample. In some instances this is a limitation and in other instances it is a desirable feature of the research design.

Inasmuch as the research reported here is part of a larger study, a few paragraphs will be devoted to an explanation of the context from which the present investigation is drawn. In September of 1952 arrangements were concluded with the administration of the public schools of Oakland, California, to initiate a study of the language development of more than three hundred children entering the kindergarten classes of that school system. With the assistance of the director of research in the Oakland schools, eleven classes of children were selected from districts representing a complete range of social and economic background for the city. In November of the school year, 1952-53, visits were made to the principals of these schools and to the kindergarten teachers involved, and in January of the same school year, the investigator and his assistant started visiting the classes in order to familiarize the children with their presence. In February the investigator and his assistant divided the work and began to collect yearly samples of the subjects' oral and written language. The schools furnished results on tests of reading and arithmetic. All these data will be described more fully in a subsequent section. In the succeeding years, this time arrangement and division of work has remained the same.

The total longitudinal study will continue until 1964-65 at which time the remaining subjects will be in grade twelve of the secondary schools.

Subjects are retained in the study as long as they remain within reach of the investigation. In practical terms, this means that they remain within the counties of Alameda, Contra Costa, Marin and San Francisco. The numbers will, of course, decrease each school year. After four years, the number remaining of the original 338 is 207. The aim is to retain as many as possible, with the expectation that one hundred or more of the original 338 subjects will be available for study in 1964-65.[6]

THE SAMPLE

The 338 subjects used in this study were chosen to represent a stratified sample of a larger universe of children. Eleven kindergarten classes were selected to represent family backgrounds typical of the city of Oakland, California. The subjects include a range of family status from definitely poor economic circumstances in the industrial areas down by the Bay through the middle class areas up to the more favored socio-economic circumstances of the hill-top districts. The evidence on socio-economic status places the median slightly below middle-class for the subjects in this research.[7]

However, stratification has not been tied to one particular variable such as socio-economic status. The choice of subjects also included stratification on the basis of sex, racial background, and spread of intellectual ability. Care was taken to avoid any unique or unusual factor of selection. In other words, fairly general stratification variables were used, together with proportional allocation. The characteristics used for defining the strata were related to the subject under investigation, inasmuch as other studies of children's language identify socio-economic status, sex, and intelligence as factors influencing language proficiency.

Of the 338 subjects initially in this study, 161 were male and 177 were female in the age range of 5.0 to 5.9. The per cent of Caucasian (85%), Negro (11%), and Oriental (4%) approximates very closely the per cent of these racial groups in Oakland, a city of about 384,575 with 14.5 per cent of the population non-Caucasian and 85.3 per cent of the non-Caucasian population Negro. Measures of intelligence (Kuhlman-Anderson) for this same group two years later reveal a mean of 102.5 and a σ of 9.18. Of the eleven classes, two had 26 pupils, two had 27, and one each had a class size of 28, 29, 31, 33, 36, 37, and 38. The sample provides clear evidence of representing the school population of Oakland. Oakland, in turn, is assumed to be typical of the urban center of the twentieth century: a varied population varying in religion, race, national background, and socio-economic conditions.

No matter how carefully a research study is designed to represent a population, the quality of its field execution affects the adequacy of the sample. In this study all children in these eleven classes were used; no exclusions whatsoever were made. Each intact kindergarten group was considered a typical public school cluster and care was taken to make sure that the clusters were not attenuated by conditions other than death or removal from the area.

THE DATA COLLECTED

In the present study evidence concerning the 338 subjects' use, development, and control of language was needed for each of these primary school children. Plans were carried out to collect data concerning their vocabulary, their use of oral and written language, their proficiency in reading and arithmetic, teachers' judgments of their skill with language, and background information on their health and homes. These data were collected over a period of seven years, from kindergarten through grade six.

Each subject was interviewed individually and his spoken responses recorded annually on a recording device, the Audograph. The Audograph reproduces sound on a plastic flexible disc and preserves a faithful reproduction of the subject's voice.[8] Each interview followed a standardized form and in cases where an extra question was asked, the purpose was solely to encourage a flow of language already on its way.[9] At the beginning of the interview, the examiner encouraged the child to become talkative by asking him questions about playmates, games, television, illness, and wishes. Next the subject was shown, for the remainder of the interview, a series of six pictures, the same pictures being used for all subjects. The pictures were chosen for their interest, their success in preliminary trials, or their value in previous research, and for special appeal to the imagination. The subjects were asked to discuss what they saw in each picture and what they thought about each picture. The recorded Audograph interviews were then transcribed into typewritten form according to a careful set of directions.[10] These transcripts of the child's oral language constitute some of the most important data collected in the study.

Additional information of value to the study includes measures of the subject's intelligence and evidence of achievement in vocabulary, arithmetic, reading and writing. In addition, for each of the seven years, the teachers rated the subjects on selected language factors, and accurate records of school attendance were kept. Background information on homes, parental occupations, health, siblings, and date of birth complete the data.

TECHNIQUES

In searching for answers in this research many different kinds of evidence and analysis have been used. For the convenience of the reader, these techniques have been classified into four groups:

... new methods of analysis originated for the purposes of this investigation

... methods of analysis derived from the research of other workers

... standardized tests

... ratings and indices for such factors as socio-economic status, school attendance, and writing ability

The techniques in each of these groups will be described in the paragraphs which follow.

New Methods of Analysis

In this research, devising an objective method for measuring the flow of oral language was a critical problem. Certain familiar systems of dividing language into segments proved to be inadequate. Words, for instance, offer a crude basis for numerical count but show nothing about relationships among ideas. Traditional grammatical divisions, such as sentences, also blur important distinctions and often do not correspond to the actuality of language where utterances may be only phrases or single words. The system of segmentation finally chosen is one which combines both structural and semantic approaches. First the subjects' speech is segmented by intonation patterns and then, within such intonation segments, syntactic units (each independent predication) are identified.[11]

... The first of these is solely dependent upon the patterns of sound made by the human voice; it does not take meaning into account but is judged solely by the contours of inflection and the pauses of the subjects' voices. Because the word phonology refers to all matters concerning the sound-system of English, these first and more comprehensive units will be called phonological units.

... The second unit, always a subdivision of the larger phonological unit, will be called a communication unit because it is identified by the meaning which is being communicated.

... Beyond these two kinds of segmentation, a third element still remained to be accounted for, an exceptionally interesting and frequent occurrence that could best be described as tangles of language which did not make semantic sense and were impossible to classify phonologically. These tangles have, therefore, been segmented separately and have been labeled mazes. Each of these three segments will now be described more fully and illustrated by examples.

The phonological unit.--An example will help to make clear what the phonological unit represents. One child in the study said the following words:

> I'm going to get a boy| 'cause he hit me.# I'm going to beat him up and kick him in his nose‖ and I'm going to get the girl, too.#

The pauses of the subject's speech, in association with his use of pitch, show two double-cross junctures (#). The double-cross is a mark to show a pause or juncture in speech which is a clear-cut termination to an utterance. It is marked by a definite pause preceded by an obvious drop in the pitch of the voice. The other two marks--double-bar juncture (‖) and single-bar juncture (|)--represent pauses of less finality. In this case, the speaker expressed two definite phonological units, units characterized by definite pauses following a definite drop in his voice.[12] The phonological unit, then, is an utterance occurring between the pauses represented by double-bar junctures. If the example given in this passage seems to show phonological units to be identical with traditional "sentences," the reader may be assured that the subjects in this study often do not let their voices drop and pause at the end of every sentence. For instance, here are two phonological units expressed by one subject:

> She pointed down to that man‖ they called an ambulance‖ and the police came with the ambulance# and the police started to question the lady#

If double-cross junctures followed the traditional definition of a sentence, there should have been a definite pause after *man* and none after *ambulance*. However, the reality is what must be marked and studied.

The communication unit.--The communication unit may be defined as that group of words which cannot be further divided without the loss of their essential semantic meaning.[13] For instance, "I know a boy with red hair" is a unit of communication. If "with red hair" is omitted the essential meaning of that particular unit of communication has been lost. "I know a boy" does not mean the same thing as "I know a boy with red hair." On the other hand, "Yes" can be a unit of communication when it is an answer to a question such as, "Have you ever been sick?" These units prove to be not solely semantic; in most cases they are also syntactic, being composed of independent predications. The following examples illustrate quickly the method of tallying these units of language. A slant line (/) marks the completion of each communication unit.

Examples of Communication Units

Transcription of Subject's Actual Language	Communication Units	No. of Words in Each Communication Unit
I'm going to get a boy 'cause he	3	11
hit me.#/ I'm going to beat him		13
up an' kick him in his nose"/ and		9
I'm going to get the girl, too.#/		

Note that the first communication unit could not be divided after "boy" without the disappearance of its essential meaning. Note in the last two communication units that a compound predicate results in one unit, but a compound sentence (which can be divided without essential loss of meanings) becomes two communication units.

The language maze.--One cannot listen to these recordings or read the transcripts without noting how frequently the subjects become confused or tangled in words when they attempt to express themselves. This occurs not only in interview situations but is easily noticeable also in the natural play of the children, in the classroom when they share experiences, and on the playground of the school. The language behavior in question is not a matter of words tumbling over one another but rather a case of many hesitations, false starts, and meaningless repetitions. In this research these language tangles have been labeled mazes. The linguistic troubles of the subjects resemble very much the physical behavior of a person looking for a way out of an actual spatial maze. He thrashes about in one direction or another until, finally, he either abandons his goal or locates a path leading where he wishes to go. Sometimes he stumbles upon a way out; sometimes he has presence of mind enough to pause and reason a way out.

These mazes are a series of words or initial parts of words which do not add up to meaningful units of communication. Sometimes the mazes are very long, consisting of from ten to twenty or more words or fragments of words. Sometimes the subjects persevere with the ideas they are trying to formulate, and at the end of the maze, do achieve a unit of communication. Other times the subjects abandon the ideas they are trying to express, perhaps finding the problem too difficult or too tiring to express, or not worth the effort. It is entirely possible that in another situation, where the motivation was much greater, the same idea represented in the maze might find its way to a clear expression of meaning. The energy level or the health of the subject may also be decisive factors in the child's success or failure in converting an idea into a genuine unit of communication.

Examples of mazes (Mazes are in brackets and the count is also circled.)*

Transcription of Subject's Actual Language	Communication Units	No. of Words in Com. Units
1. (Short maze at the beginning of a communication unit and integrally related to that communication unit.) ["I'm goin'] ... I'm goin' to build a flying saucer/ but I can't think how yet."#	2	③-9 7
2. (Short maze in the middle of a communication unit and integrally related to that communication unit.) "When I was fixin' ready to go home, my mother called me up in the house/ an' [an' an' have to] I have to get my hair combed."#	2	16 ④-7
3. (Long maze not immediately related to a communication unit. The child apparently drops the whole project as being too complicated for his powers.) "I saw a hunter program last Sunday/ [an' he, an' snow time he had to have lot uh, wah-h when he, uh, not too many dogs, he ...]/ and that's all I think of that picture."#	2	7 ⑱ 9

Such mazes are not counted as communication units. The procedure has been to count the words in them, however, and then circle them. The reader will note that when a maze is removed from a communication unit, the remaining material always constitutes a straightforward, acceptable communication unit. However, just as the communication units fall within phonological units, so too do the mazes fall within phonological units.

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* In the actual transcript, the analyst brackets and encircles mazes with red pencil.

These three new methods of analysis ([1] the phonological unit, [2] the communication unit and [3] the maze) were applied to the transcripts of the subjects and have become the basis for what is called the First Level of Analysis.

First Level of Analysis.--The communication units, either coinciding with the phonological units or occurring within the phonological units, come close to being what is traditionally known as sentences. But to ignore the phonological method of segmentation would mean to throw away important syntactical clues. Thus, to the syntactic and semantic approaches to language, we have joined the phonological. The result proves to be one which takes *maximum advantage both of structure and of meaning*. Although communication units are not inevitably divided by double-cross junctures, they are very frequently marked by such terminal pauses. In instances where they are not, either a double-bar or a single-bar juncture does occur *without exception*. Thus assured of genuine segmentation, the research worker can next ask what to do with the segments.

The next step was to identify the patterns into which the communication units fell. Such patterns are those described in recent linguistic studies, the few patterns of structure underlying all the ways of expressing meaning in the English language, such patterns as these:

... Subject - Verb	George eats.
... Subject - Verb - Object	George eats onions.
... Subject - Linking Verb - Predicate Nominative	Onions are roots.
... Subject - Linking Verb - Predicate Adjective	Onions are good.
... Subject - Verb - Inner Object - Object	George gave John an onion.

Although linguists vary in their classification, approximately ten patterns represent all the structures of the English sentence. This First Level of Analysis, then, will show the frequency and variety of syntactic patterns used by the subjects. It will show whether or not children know these patterns before they come to school, merely elaborating them thereafter or whether they learn to use some of these patterns after they have entered school. It will show whether some children use certain patterns more often than others. It will show whether or not the same patterns of structure are used for writing as for speaking and it could be used to show whether or not the patterns occurring in children's readers tally with the patterns children use in their speech.

To simplify the technique of analysis on this First Level, the following symbols were used:[14]

1	2 ②	3	4	5	6	M	Z △2	X	U	+	‡	T	O	W	?

1 = subject

This includes both the nucleus (central word) and its satellites (modifiers, articles, appositives, restrictive and non-restrictive clauses).

Example: $\overset{1}{\boxed{\text{The fat robin with the sharp bill}}}$ was flying swiftly.

2 and ② = verbs used as predicates

This includes the nucleus (the verb) plus auxiliary verbs and satellites.

Example: The fat robin $\overset{2}{\boxed{\text{was flying swiftly.}}}$

2 represents transitive and intransitive verbs

Examples: The robin $\overset{2}{\boxed{\text{eats.}}}$

The robin $\overset{2}{\boxed{\text{eats}}}$ worms.

② represents linking verbs

Examples: The bird $\overset{\textcircled{2}}{\boxed{\text{is}}}$ a robin.

The bird $\overset{\textcircled{2}}{\boxed{\text{is}}}$ red.

The music $\overset{\textcircled{2}}{\boxed{\text{sounded}}}$ loud.

3 = the inner complement (indirect object)

Example: She gave $\overset{3}{\boxed{\text{the boy}}}$ some bread.

4 = the transitive verb complement (direct object)

Example: The machine crushed $\overset{4}{\boxed{\text{the rock.}}}$

5 = the linking verb complement (predicate adjective, predicate nominative, or other elements used as subjective complement)

Examples: The bird is a $\overset{5}{\boxed{\text{robin.}}}$

The bird is $\overset{5}{\boxed{\text{red.}}}$

The time is $\overset{5}{\boxed{\text{now.}}}$

She seems $\overset{5}{\boxed{\text{happy.}}}$

6 = the outer complement

Examples: We elected him $\overset{6}{\boxed{\text{president.}}}$

She painted her house $\overset{6}{\boxed{\text{purple.}}}$

We found her $\overset{6}{\boxed{\text{alone}}}$. . . we found her in $\overset{6}{\boxed{\text{tears.}}}$

M = the movable parts of a sentence (words, phrases, or clauses with no fixed position. However, the "movability" varies. Some elements prove to be more movable than others.)

Examples: Boys $\overset{M}{\boxed{\text{usually}}}$ like dogs better than cats.

$\overset{M}{\boxed{\text{The rain having stopped,}}}$ they went home.

Z = a maze

Example: [. . . an' he, and snow time he had to have lot uh, wah-h when he, uh, not too many dogs, he . . .]

△ = a false start, a shift in expression, but not the confusion of a maze

Example: I was going to buy △ three little . . . no, four big bars.

X = words of little meaning value used as primers or launchers (well, see, you know, let's see, yeah) or as fillers (or something, and so forth)

U = short utterance, a word or group carrying meaning, with a falling intonation (Yes, O.K., I think so)

+ = a sentence connector (and, but, so, and so)

‡ = subordinators, subordinators used as connectors (until, since, if, although, because, etc.)

T = topic followed by subject

Example: T The man in the picture, well, he is thinking about his pal.

O = ellipses of an essential part of the sentence

W = question words (who, when, why, what, where, how)

? = unanalyzable construction (This is not a maze but a construction about which the analyst cannot be certain; these occur very rarely, for usually the combination of phonological, syntactic, and semantic evidence dispels the need for a ?.)

Applying these symbols to the communication units then became the next step. Each communication unit, it will be remembered, is a syntactic unit verified by two methods--the fact that phonologically it is separated from the surrounding language by an intonation juncture and the fact that semantically it is an independent predication which communicates meaning. Analysis shows that all communication units, once any mazes have been cleared away, may be classified under the following ten patterns:

Pattern	Symbol	Examples
one	1 2 or 1 ②	Mary eats. (or) Mary is home.
two	1 2 4	Mary eats strawberries.
three	1 ② 5	Strawberries are berries. Strawberries are good.
four	1 2 3 4	Mary threw the dog some biscuits.
five	1 2 4 6	They elected Mary president. They thought Susie conceited.
six	(1) ② 1	Here is Mary. There are four houses on Lime Street.
seven	Questions	How does he do it? Is he here?
eight	Passive forms of 1 2 4	Strawberries were eaten by Mary.
nine	Requests, commands	Go home. (or) Let us go home.
ten	Partials	Any incomplete unit

Second Level of Analysis.--The Second Level of Analysis is a deeper analysis of the elements comprising the First Level of Analysis. The First Level provides a skeleton picture of communication units which may then be examined for patterns of structure, a matter of genuine importance in linguistic study, whereas the Second Level examines the component parts of the pattern displayed at the First Level. Do some children use more subordinate clauses than others? Which children use only single words for 1's, 4's or 5's, and which ones use infinitives, clauses and verbal phrases? From the First Level of Analysis any element in the formula--the M's (movables), the 1's (subjects), the Z's or any other element--may be chosen for more complete analysis on the Second Level. For instance, what repertoire of movables does a child produce? Does he use single words only or elaborate clusters of phrases and clauses? What does a study of his verbs reveal? The possibilities of fruitful analysis at the Second Level are numerous.

Two other tools of analysis, also original with this study, were the classification of the subjects' speech in terms of function, and the classification of the subjects' style of speech (such features as fluency, energy of speech and distinctness of articulation). These last two methods--requiring great amounts of time to carry out--were used only with the two special groups included in the design of this study--the subjects designated as high and low in language skill.

Function of communication units.--In any study of language, it is desirable to consider not only quantitative aspects such as units and mazes but also qualitative aspects such as the uses to which language is put. Other research workers have classified the functions of children's speech into various categories, categories determined by the conditions under which the samples were taken. For instance, Piaget (26) divided the functions of children's playground speech into categories of egocentric and socialized speech. Rugg and others (27) chose classifications such as self-assertion, verbalized perception, and linguistic experimentation. The content of communication varies so greatly with the situation in which it occurs that no universal set of function-classifications has emerged from research. Categories devised for studying the functions of language will always depend on the purposes of the investigation and the situation from which the language sample is drawn. In this present research, the subjects' transcripts were studied in order to determine categories that actually characterized communication in the situation from which the subjects' language was recorded.[15] The most useful and suitable categories proved to be seven kinds of expressions:

... fact and perception

... comment or interpretation

... tentativeness or supposition

... generalizations

... personal associations

... irrelevancies

... direct questions

It is worth noting that in a different situation, the categories used here might not be fully comprehensive. The functions of language shift from situation to situation. Classification in this research was not intended as a contribution to the study of function; instead, it was part of the search for techniques which might reveal differences between subjects high and low in language ability.

Classification of oral language style.--Another method of analysis created for this research was based on style rather than content. In oral language, each individual uses a distinctive style or manner of speaking, one closely related to his personality. People speak impulsively or deliberately, fluently or hesitantly, loquaciously or laconically. The outstanding features of linguistic style have been noted and named for centuries; thus it is possible for an analyst to describe such features and to focus upon one feature at a time in a situation where the recordings could be played and replayed as many times as necessary.

In this study, even in the kindergarten year, the subjects expressed themselves in highly varied styles of speech. Eleven outstanding features of spoken style were identified, each one being stated as follows in the form of a continuum:

fluent	to halting
deliberate	to impulsive
coherent	to incoherent, disorganized
energetic	to listless, weak, tired
laconic	to loquacious
expressive	to flat, expressionless
mature	to babyish
distinct, clearly articulated	to blurred, indistinct, mumbled
appropriate, conventional usage	to unconventional, inappropriate usage
readiness of response	to slowness of response
relaxed	to tense, strained

Two analysts, trained in the field of speech, listened to the recordings of the two special groups, those subjects who were most skilled and least skilled in language. Each analyst listened for a single feature while all records were played in a random order. When the first feature--deliberate to impulsive--had been completed, the analyst turned his attention to the second feature. Once again, all records for the two groups were played in a new random order, the analyst having no access to names or other identifying labels. As the analyst listened to each recording, he had before him three cards representing the ends and middle of each continuum. For instance, the cards for the first feature read as follows:

Card One	Card Two	Card Three
Fluent	Average	Halting
Manifest smoothness and fluency in speech; in comparison to most subjects, words flow easily.	Not notable either for fluency or the lack of it. (Or: evidence that both some fluency and some hesitation exists.)	In comparison to most subjects, uses hesitant, faltering speech. Words frequently seem to come with difficulty; pace is jerky and labored.

As the judges listened to each record, these three cards lay before them in sufficient quantity for all subjects in the two special groups. To assist the judges and to offset any possibility of accidental error, the cards were printed on three colors; blue for Fluent; white for Average; and orange for Halting. The same system of cards and colors was prepared for each of the eleven features. As the judge made each decision, the card he chose was labeled with the subject's name.

Before the judges began the process of assigning cards for each feature of linguistic style, they were given practice in listening for the same feature in the recordings of subjects not included in the two special groups or the group drawn at random. The two judges, operating separately from each other, were not influenced by any knowledge of the other's judgments. They were permitted to hear any recording as many times as they wished or deemed necessary for making a decision. The judges never knew which child (or which one of the seven years of recording for each child) was being judged.

To determine whether or not the judges' ratings revealed any relationship between a feature of linguistic style and the subjects' proficiency in language, the investigator used the chi-square test in the following manner:

> Instead of the usual null hypothesis with identical theoretical frequencies in each cell, this method derives empirical frequencies by selecting at random an equal number of subjects from the total group (which included the high and low subjects as well as all others) and determining their actual scores on each feature of linguistic style. The judges, in other words, rated the subjects from the subgroup chosen by random tables as well as the high and

low subgroups. For instance, on the fluency versus hesitancy feature of spoken style, the results appear as shown below in Tables 1a and 1b. The reader will note that instead of the theoretical frequencies customarily used in chi-square analysis, the frequencies of the group in question (in Table 1a, for instance, the 30 members of the high group) are compared with the actual frequencies of an equal number of subjects drawn at random from the total group. In other words, actual frequencies are substituted for theoretical frequencies. For significance at the one per cent level of confidence, only 9.21 is required for χ^2 (in such a three-celled table with two degrees of freedom) in Tables 1a and 1b. A result of 53.25 (in Table 1a) or 24.56 (in Table 1b) is much more than sufficient to reject the hypothesis that no significant differences exist between the high group and the random sample from the total group. Another way of stating this would be to say that the result demonstrates a genuine positive relation between fluency and a high rating on language proficiency.

This method of analysis makes it possible to deal with important aspects of language which heretofore have been elusive to the point of discouraging needed research. Admittedly the style which survives statistical analysis is grouped roughly into three categories (for instance, fluent, average, hesitant) and thereby vastly oversimplified. Nevertheless, this application of the methods of science to the problem of oral style reduces the abrupt and obscure, revealing the presence of order behind apparent complexity. Consequently the technique was applied to the eleven features of style, both for high and low groups.

Table 1a

LINGUISTIC STYLE: FLUENCY-HESITANCY FEATURE

Application of Chi-square to Scores of 30 Subjects Identified as High in Language Skill

(Scoring by Judge Number One: V.S.)

Rating	Empirical frequency 30 subjects drawn at random from total group	Frequency for 30 subjects in high group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Fluent	6	22	+16	256	42.66
Average	16	5	-11	121	7.56
Hesitant	8	3	- 5	25	3.13
Total	30	30			$53.35=\chi^2$

In a three-cell table with two degrees of freedom, a χ^2 of 53.35 is significant at the one per cent level of confidence.

(Scoring by Judge Number Two: L.L.)

Rating	Empirical frequency 30 subjects drawn at random from total group	Frequency for 30 subjects in high group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Fluent	8	22	+14	196	14.00
Average	16	5	-11	121	7.56
Hesitant	6	3	- 3	9	3.00
Total	30	30			$24.56=\chi^2$

In a three-cell table with two degrees of freedom, a χ^2 of 24.56 is significant at the one per cent level of confidence.

Table 1b

LINGUISTIC STYLE: FLUENCY-HESITANCY FEATURE

Application of Chi-square to Scores of 24 Subjects Identified as Low in Language Skill

(Scoring by Judge Number One: V.S.)

Rating (grade 4)	Empirical frequency 24 subjects drawn at random from total group	Frequency for 24 subjects in low group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Fluent	10	4	-6	36	3.60
Average	13	14	+1	1	0.07
Hesitant	1	6	+5	25	25.00
Total	24	24			28.67

In a three-cell table with two degrees of freedom, a X^2 of 9.21 or more is significant at the one per cent level of confidence.

(Scoring by Judge Number Two: L.L.)

Rating (grade 4)	Empirical frequency 24 subjects drawn at random from total group	Frequency for 24 subjects in low group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Fluent	6	3	-3	9	1.50
Average	16	14	-2	4	0.25
Hesitant	2	7	+5	25	12.50
Total	24	24			14.25

In a three-cell table with two degrees of freedom, a X^2 of 9.21 or more is significant at the one per cent level of confidence.

Methods of Analysis Derived from Other Research.

Four types of analysis applied to the data represent procedures already used by previous research workers. These four procedures are (1) a study of hypotaxis (the amount of subordination); (2) classification of conventional usage, syntax, and grammar; (3) classification of vocabulary according to frequency of use in the language; (4) the type-token ratio, that is, the number of different words used to the total number of words. Each of these procedures will be described in the paragraphs which follow.

Hypotaxis.--Both logical analysis and previous studies of language (2, 15, 11) have designated subordination as a more mature and difficult form of language expression than simple parallel statements connected by *and* or *but*. Phrases and dependent clauses are verbal patterns for showing relationships; by means of them, speakers communicate more elaborate statements than are possible with simple independent clauses. Furthermore subordination makes possible a more coherent organization of a series of statements.

In this study, the incidence of subordination was tallied for the subjects who were exceptionally high or low in language ability and for a group of subjects chosen at random from the total sample. All subordinate clauses, both for speaking and for writing, were counted and classified according to order of subordination (first order, second order, etc.).[16]

The ability to show the natural or logical relations in the content being communicated by language does not, however, depend solely upon subordinate clauses. Prepositional phrases, infinitives, appositives, verbals, and other strategies of structure serve the proficient speaker or writer in expressing and compressing his thought. Therefore, the index of subordination, valuable though it has proved to be in revealing the degree of proficiency for subjects in this research, is nevertheless crude and limited. A complete index of the structural complexity in the subjects' transcripts would encompass more than subordination. A technique for studying such complexity is emerging from the current theoretical work of the American linguist, Naom Chomsky.[17] His transformation analysis is time-consuming, but it has been applied to the transcripts of two subjects in this research and shows great promise as a technique for studying children's language. The method and results are described on pages 000-000 of this monograph. The results show every indication of being a more complete and incisive extension of the subordination index used by La Brant (15) and by the present research. Future research in language will undoubtedly develop and use to advantage Chomsky's transformational analysis.

Difficulties with conventions in usage and grammar.--For a classification of non-standard usage, syntax, and grammar, this research employed the categories established by Charters (5) and O'Rourke (24) with modifications necessitated by the fact that those studies were based upon written language and in this research the analysis is of spoken language. Consequently punctuation, spelling, and capitalization categories were omitted.[18] Thus the unconventional structures tallied for all subjects in the study were as follows:

items involving usage
items involving the use of verbs
items involving the use of pronouns
items involving syntax
items involving omission or repetition
items involving the use of prepositions and conjunctions
items involving the use of modifiers
items involving the use of nouns (i.e., singular, plural, etc.)

Several of these categories required further subdivision in order to avoid blurring important distinctions. The complete guide to classification is available from the writer. This analysis of usage, grammar, and syntax was carried out for all pupils in this study and for each year.

Vocabulary measured by word frequencies.--Two measures of vocabulary power were based upon methods used in previous research. By using the count of word frequency by Thorndike and Lorge (30), the investigator was able to tally the subjects' words according to their frequency of occurrence in the English language. What per cent of a speaker's words occur in the thousand most commonly used words? What per cent occur in each of the subsequent thousands as presented in Thorndike's count of word frequency? How do the subjects in the high special group compare with the subjects in the low special group? Considerations of time and cost limited this count to the two special subgroups high and low in language power.

Vocabulary measured by type-token ratio.--Although the type-token ratio has sometimes been criticized, it can disclose important distinctions *when the size of language samples is kept uniform*. The type-token ratio (TTR) is the ratio of the number of different words (types) to the total number of words (tokens) in a sample of language. Johnson and others (13; 6) have used this ratio as a measure of verbal diversification, showing that a writer or speaker who uses a large vocabulary has a more diversified style than one who uses a small vocabulary.

One difficulty with the TTR is that it necessarily becomes smaller as the size of the language sample becomes larger. In the present research, the TTR could have discriminated against subjects who used the most language, for as the length of a sample increases, the possibility that words will be repeated becomes greater than the likelihood that new words will occur. In order to control this factor in analyzing the low and high groups, the investigator divided all transcripts of the subjects' oral language into segments of 100 words and in each segment counted the new words that had not appeared before in any preceding segment. From these counts curves were constructed, plotting the number of new words per segment. These curves show directly the rate at which members of both special subgroups introduced new words into the language samples.

Tests.

Three tests were administered to the subjects, a vocabulary test used solely in this study, an intelligence test, the latter a part of the regular testing program of the Oakland Public Schools, and a test of ability to use subordinating connectors such as although, because, unless, etc.

Vocabulary.--The vocabulary test of one hundred items was administered orally and individually to each subject during the kindergarten year. This vocabulary test was adapted from one devised by A. F. Watts, British research worker. British items such as tea-house were changed to restaurant or café. All items on the vocabulary test were questions which Watts avers an average child of the age of eight and one-half should know. Typical questions are those in which the questioner asks, "What am I touching?" as he places his finger on his nose, eyebrows, or elbow. The British version is included in Watts' book, The Language and Mental Development of Children (34). This vocabulary test, weighted equally with the average of seven years of teachers' ratings,[19] becomes the basis for selection of the 52 subjects at the two extremes of language ability. Hereafter in this monograph, this combined score of a language rating and a vocabulary test is frequently referred to as LRV (Language Rating - Vocabulary).

Intelligence.--In the second grade of the Oakland primary schools the Kuhlmann-Anderson Intelligence Test is administered to all pupils. Where a discrepancy appears between a pupil's score and the teacher's observations of the pupil's intellectual performance in class, further testing is carried out with another of the same test or the individual Stanford-Binet Scale. Intelligence tests are also repeated in later grades. All these scores were available for the subjects in this study. Subjects who had moved to nearby school districts by this time were also tested with the same tests.

Use of subordinators.--Watts (34) has devised a test calling for the completion of unfinished sentences broken off at the point where a subordinating connector has just been introduced. The correct completion has to be selected from among four phrases offered as possibles. An example follows:

I shall not be able to do my arithmetic unless

(a) my exercise book is full

(b) you help me

(c) multiplication is very hard

(d) I forget my tables.

Watts presents percentages of right answers for 370 children between the ages of $7\frac{1}{2}$ and 11. His test was administered to the subjects of this research in grades four, five, and six.

Ratings and Indices.

In addition to the techniques and tests already described, six important ratings or indices were procured for all subjects in the study. These indices quantified teachers' yearly estimates of language ability, records of reading ability, writing ability, socio-economic status, health, and school attendance.

Teachers' ratings of subjects.--For each year of the study, the teachers of the subjects rated them on selected language factors: (1) amount of language; (2) quality of vocabulary; (3) skill in communication; (4) organization, purpose, and control; (5) wealth of ideas; and (6) quality of listening. The five-point scale used for this purpose is reproduced here for the reader's information. Inasmuch as this scale, along with the vocabulary test, comprised half the basis on which the investigator selected the 52 special subjects representing the extremes of language ability, the scale merits particular mention. The reader's attention is directed to the fact that for each subject four of these rating scales were available, one from each of four teachers. The average score for these four ratings was given equal weight with the vocabulary scores in order to determine the two groups at the extremes of language ability.

ORAL LANGUAGE SCALE

Name of child______________________________ Date of rating____________________
Last name first

Teacher____

TO TEACHERS

Your cooperation on the following points will be greatly appreciated.

1. Rate all the children on item Number One before rating them on item Number Two. This is very important. (This applies only to teachers who have more than one of the pupils involved in this study.)

2. In rating each item, disregard your ratings for that child on every other item; try not to let general impressions color your judgments about specific aspects of the child's behavior.

3. We would most certainly appreciate any comments, illustrations or noteworthy episodes that throw light on the ratings. Write them in any empty space or at the end.

In the following items, five points are indicated. 5 is High and is described by the words at the right-hand side of the scale. Number 1 is Low and is described by the words at the left-hand side. 2, 3, and 4 represent degrees between high (5) and low (1). PLEASE CHECK BY ENCIRCLING the number appropriate in each case.

****

ORAL LANGUAGE SCALE continued

1.	Skill in communication	no awareness of listeners; speaks without any effort to evoke understanding from others; pace of words and inflection of voice not adjusted to listeners	1 2 3 4 5	adjusts pace of words and inflection to listener; uses an "imparting tone"; is aware of need to make self understood
2.	Organization, purpose, and control	rambles; no sense of order or of getting to the point; rattles on without purpose; cannot tell a story in proper sequence	1 2 3 4 5	plans what is said; gets to the point; controls language; can tell a story in proper sequence
3.	Wealth of ideas	never expresses an idea; appears dull and unimaginative; doesn't originate suggestions or plans during play periods	1 2 3 4 5	expresses ideas on many different topics; makes suggestions on what to do and how to carry out class plans; shows imagination and creativity in play
4.	Amount of language (regardless of quality of language)	seldom talks; exceptionally quiet; needs to be prompted to talk	1 2 3 4 5	talks freely, frequently, and easily; talks almost all the time, if permitted
5.	Vocabulary	uses a meager vocabulary, far below that of most children this age; inarticulate; mute	1 2 3 4 5	uses a rich variety of words; has an exceptionally large and growing vocabulary; speaks fluently
6.	Quality of listening	inattentive; easily distracted; seldom attends to the spoken language of others	1 2 3 4 5	superior attentiveness and understanding of spoken language

Other comments:

Your comments here on the language of the child are most helpful to the research. (Use other side if needed.)

Index of reading ability.--For each child, complete cumulative records of reading progress were kept from year to year, listing the pre-primers, primers, readers, enrichment or supplementary readers, and recreational reading completed. In order to reduce the multiplicity of reading to a manageable score, the investigator assigned numerical weights to each of these books. The final sum for each subject, called the reading index, represented scores ranging from 3.5 for one child still unable to read much of anything at the end of the grade three to 59 for the most accomplished reader in the group. The exact formula and its application is available from the writer. In this study the reading index is used for inquiry into correlation among the language arts and for information on the uses the subjects have for language.

Index of writing ability.--Beginning with the third grade, a sample of the subjects' writing was taken under standard conditions for all. A picture, in colors and somewhat complicated as to content, was shown to all subjects and they were permitted to write until they gave obvious evidence of having exhausted their fund of writing energy for this particular picture.

Two judges, both teachers of writing, classified these samples of writing into four categories as follows:

I Superior: Uses some variety of sentence structure; gives evidence of organization of ideas; attempts to relate picture content to past or present experience; gives time, place, or setting; includes a title for the story; employs vigorous verbs; shows evidence of awareness of the reader.

II Good: Interprets only the most obvious elements; begins to organize but strays from the basis of organization; uses limited pattern of sentence structure; interprets only the most obvious elements in the picture (just barely achieves an interpretation); displays monotonous repetition in vocabulary.

III Inferior: Uses language that is barely comprehensible; no idea or at best a weak idea of sentence structure; uses nouns to name objects but offers few or no verbs; has no interpretation or an interpretation with no relation to the picture; spelling so non-conventional as to be almost incomprehensible; no attempt at organizing or interpreting.

IV Illiterate: Resorts to pictures or drawings rather than words; symbols convey no meanings.

The classification assigned to the subjects' writing was then used for a study of its relation to achievement in reading, oral language, and other measures of the subjects' use of language.

School attendance.--Because the financing of education in California is based upon average daily attendance in school districts, strict records of attendance are kept in all schools. For each subject in the study it was possible to locate an exact record of the number of days present in school and to relate this index of school attendance to such matters as reading, writing, and speaking ability.

Socio-economic status.--The occupation of both parents (or of legal guardians) was determined for all subjects and classified according to the Minnesota Scale for Paternal Occupations (22). This Scale was developed at the Institute of Child Welfare, University of Minnesota, as a basis for classifying persons into socio-economic groups at a time when the Institute was looking for an instrument which would enable it to secure a cross section of the population. The Taussig classification, the Burr scale, and the U.S. Census classifications were used in the development of this scale, which places occupations in seven categories. In using levels of occupation, the Minnesota Scale differs from the U.S. Census classification. The latter uses types of service (for example, a physician and his assistants are all listed under professional service in the Census classification, whereas in the Minnesota Scale, these occupations are distributed over several classes). In 1930 and 1940 classifications of the U.S. Census data were checked in terms of the categories of the Minnesota Scale. While there had been some shifts, the population remained relatively stable in occupational distribution. Table 2 shows the relative distribution of the population for these various samples in which the Minnesota Occupation

Scale has been used. Two judges carried out these ratings, using as guides the Alphabetical Occupational List for Classification of Occupations furnished with the Minnesota Occupational Scale and the Dictionary of Occupational Titles (7). To check on the reliability of the two judges' ratings, one with the other, 70 subjects were chosen by Fisher and Yates' Table of Random Numbers (9) and a comparison made. Sixty-four cases were ranked the same and six cases differed by one point.

Energy and health.--The Oakland Public Schools maintain an extensive program of physical examinations and preventive medicine. A special blue cumulative card, devoted solely to physical and mental health, records the observations of physicians, school nurses, teachers, and special home visiting teachers. For all subjects in this research, data concerning health were collected for the research files. For the special groups (those of low and high ability), these cards were scrutinized and further inquiry was made in cases where any doubt existed concerning the data. In addition, in the recorded interview the subjects were asked each year to describe any illnesses or poor health they had experienced.

VALIDITY AND RELIABILITY

As in all studies, basic questions must be asked: Do these techniques and procedures accurately measure what they are intended to measure? How much error is present in measures purporting to reflect the phenomena under examination? How consistent are these measures if applied several times? Even when samples are truly representative of the total population, these problems of validity and reliability require attention.

All judgments and classification in this research have been made by two or more competent workers with background for the job and special training for the particular task. For each of these tasks explicit coding

Table 2

Per Cent of Four Sample Populations Appearing in the Seven Categories of the Minnesota Occupational Scale Over a Period of 25 Years

	Socio-economic Level	Goodenough and Anderson[a] 1930	Hansen[b] 1940	Loban[c] 1948	This Study 1953-6
I	Professional	3	3	3	4
II	Semi-professional	5	7	9	8
III	Clerical Skilled Trades Retail Business	14	14	17	20
IV	Farmers	19	15	13	All Urban Sample
V	Semi-skilled Occupations	27	24	36	39
VI	Slightly Skilled Trades	13	15	18	20
VII	Day-laborers	19	22	2	9

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[a] *Minnesota Scale for Paternal Occupations*, Institute of Child Welfare, University of Minnesota, University of Minnesota Press, Minneapolis.

[b] *Ibid*.

[c] Loban, Walter, "A Study of Social Sensitivity (Sympathy) among Adolescents," *Journal of Educational Psychology*. Vol. 44, No. 2, February 1953, pp. 102-112. This sample included 376 cases in midwestern communities.

directions have been prepared and used. (Available from the writer.) The reliability of all such judgments has been checked by the formula Lewin and his colleagues first used in their comparison of the Boy Scouts of America with the Hitler Youth Movement.[20]

$$\frac{2 \times \text{the sum of agreements}}{\text{sum of the items checked by both judges}}$$

(This formula can be varied for three or more judges.) These reliability scores are all reported in Table on page 000.

Repetitions of the same situation offer one kind of reliability measure. In the first year of this study, 15 subjects were interviewed twice by two different interviewers. These transcripts, along with seven more accumulated during the primary school years, provided an opportunity to determine reliability for such matters as length of response, vocabulary count by Thorndike's frequency list, number of communication units and mazes, classification of linguistic style, and function of communication units. This evidence is presented in Table on page .

The basis on which special groups have been selected provides a further test of validity of measures. Since there are numerous significant differences in means for the two groups and these significant differences fall logically and consistently in the same direction as the selection of the groups, such coincidence of logical and statistical evidence offers additional assurance of validity for those aspects of the study.

Supplementary validation can be examined for a number of factors in this study. Further validation is possible, for instance, with the four measures of vocabulary: the teachers' ratings, the Watts' vocabulary test, the Thorndike Word List, and the type-token ratio. In the classification of a subject's linguistic style, qualities such as hesitancy and faltering bear a logical relation to the number of mazes counted on his typed transcript. On the language rating scale used by the teachers one item is devoted to amount of language, regardless of quality, and these ratings can be compared with the total number of words the subjects use in the four annual interviews as well as the scores on the loquacity scale for linguistic style. All these validating comparisons are shown in Table on page .

From previous research,[21] we may expect language development to show a consistent relation to socio-economic status. In this research the results on such matters parallel other research. Previous research has also established subordination as a measure of more complexity in linguistic expression and of more mature mental activity. Thus, the positive relation found between intelligence quotients for the subjects in this study and the subordination count constitutes further validation. (See Chapter III, Findings, for these results.)

If some subjects remain in the same relative positions with respect to the rest of the subjects from year to year, some evidence on reliability will be established and even more important, evidence on the possibility of prediction will be produced. Whether or not all or any of these means of checking validity and reliability are favorable to this research will appear in the statistical results. The next section of this monograph will present those findings.

SUMMARY

The plans and arrangements for a longitudinal study of a representative sample of subjects have been described. In addition to the complete sample of kindergarten pupils, two special subgroups have been identified for intensive study: a group of 30 subjects exceptionally high in language ability and a group of 22 subjects exceptionally low in language ability. These two groups have been selected by weighting equally (1) the vocabulary test administered in the kindergarten and (2) the combined score of the ratings by seven teachers who taught the subjects in the kindergarten and elementary school years. These two measures have been converted to standard scores and given equal weight with a mean of 50 and a σ of ten. All those two standard deviations or more from the mean were selected to comprise the two special groups representing the two extremes of language ability.

The techniques and procedures by which the data were collected and analyzed have been presented under four headings: new methods of analysis; methods based on previous research; tests; and ratings or indices. Statistical methods, where used, have been identified in terms of purpose; and considerations of the procedural validity and reliability have been discussed.

In the next section, the findings, resulting from the application of these procedures and techniques, are presented under headings related to the purposes of this research.

III. FINDINGS

The previous chapter has described the research design and the procedures for gathering and analyzing evidence on children's developing use and control of language. The present chapter deals with the results of those procedures. The evidence on fluency will be presented first; next in order will follow the findings on effectiveness and control of language, the use of language, and the interrelationships among the various aspects of language. A final section will present findings concerned with sequences of development and individual patterns of growth.

FLUENCY

Readiness and smoothness of speech are part of proficiency with oral language. A parallel fluency appears in the writing of such men as the poet Shelley or Winston Churchill, poets and authors whose written and oral language excels that of the average person. Obviously fluency with words unaccompanied by organization or coherence can be a vice rather than a virtue, but the ability to find words with which to express oneself--and to find them readily--is normally one mark of success with language. The initial examination of the data in this study, therefore, will examine the subjects' fluency.

The findings on fluency are drawn from four sources: (1) the amount of language uttered by all subjects; (2) the subjects' freedom from mazes; (3) the extent of their vocabularies; and (4) their manner of speaking as quantified by two classifications of linguistic style, the ratings for fluency-hesitancy and for readiness-slowness of response.

For sheer amount of language--regardless of its quality or coherence--transcripts of the children's interviews show a four-year range from one transcript totalling two words to one totalling 2,142 words. Table 3 shows the means and measures of variability for total number of words in the transcripts. As indicated by the increasing mean in column one, the subjects speak more words each of the succeeding years. During these four years they also increase the number of communication units and the average number of words spoken in each of those communication units.

The mazes show a different pattern; the total number of mazes and words in mazes does decrease from year to year, but the average number of words in the mazes increases for the low subgroup. By comparing Table 4 with Table 3, the reader will see that two contrary trends are operating among the subjects. Those who are rated as skillful with language are reducing both their incidence of mazes and number of words per maze: The number of mazes decreases 35 per cent; variability on words per maze decreases more than 50 per cent. On the other hand, those rated less skillful with language are increasing both the average number of words and the variability of the number of words they use in each maze whereas the number of mazes they are using is decreasing only slightly (a 9 per cent decrease).

For the two subgroups, these findings on amount of language are shown on Table 4. On total number of words the higher group obviously exceeds the low group in every year of the study. Both groups make a steady increase from year to year in the average number of words for each unit of communication, but the high group consistently exceeds the low group by one or two words. The range in performance as shown by the standard deviation is about the same for both groups. On number of mazes, however, the low group exceeds the high group after the kindergarten year and after that year varies more in its performance. Although at the present we have only four years by which to judge mazes, we may see from the data in Table 4

Table 3

Amount of Language: Total Group of Subjects

Measures of Central Tendency and Variability for Words, Communication Units and Mazes

	Total number of words in transcript		Communication units		Total number of words in communication units		Average number of words per communication unit		Mazes		Total number of words in mazes		Average number of words per maze	
	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
Kindergarten. (N=338)	555.48	478.00	99.74	28.07	487.13	391.22	4.81	1.33	25.31	21.42	68.35	67.24	2.58	.97
Grade One... (N=260)	618.66	314.62	92.00	30.33	557.00	260.43	6.05	1.37	23.15	16.97	61.66	54.19	2.48	.92
Grade Two... (N=227)	581.00	295.87	103.50	55.00	529.40	263.34	6.57	1.18	20.60	15.23	51.60	32.53	2.39	.92
Grade Three.. (N=207)	778.40	383.31	109.80	37.74	730.50	342.75	6.65	1.81	20.5	16.21	47.90	40.56	2.45	1.34

that the high group is reducing both the number and variability of words per maze whereas the low group, on this obstacle to fluency, is increasing the number of words per maze as well as its range of performance. Furthermore, these increases of number of words in mazes and words per maze are occurring in a low subgroup whose communication units and words per communication unit have a lower incidence than those of the high subgroup. In other words, the members of the low subgroup say less and have more difficulty in saying it. As to the number of mazes for the total group, reduction in both frequency and variability is the picture over a seven-year span.

Studying the data for words and mazes, however, is not enough. We must also see how the subjects behave when they use words in syntactic units that communicate meaning. For this we turn to a scrutiny of the communication units. For the number of communication units, figure 1 shows the interquartile ranges for the total group and the two subgroups. The overlapping is fairly large. However, the means and the quartiles of the high and low groups never cross; the high group always maintains its lead on amount of communication units. For a study of consistency of performance, correlation coefficients were obtained for the scores of the same individuals from one grade to the next for grades one through six. These correlations are given in Table 5. The results show that individuals are maintaining consistency of performance on the number of units of communication they use.

From one school year to another, amount of meaningful language increases slowly and gradually. On the average, children high in language ability maintain their initial superiority over those who are low in language ability. In respect to mazes, members of both groups continue to have trouble with

Table 4

Amount of Language: Low and High Groups

Measures of Central Tendency and Variability for Words, Communication Units, and Mazes

Highest Group

(N=30)

	Total number of words in transcript		Communication units		Total number of words in communication units		Average number of words per communication unit		Mazes		Total number of words in mazes		Average number of words per maze	
	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
Kindergarten.	705.00	363.72	105.60	36.06	640.00	333.46	5.76	1.53	23.81	15.10	64.6	61.7	2.61	1.48
Grade One....	715.53	334.76	93.00	31.73	661.40	296.43	6.89	1.39	20.27	12.13	54.2	52.9	2.23	.67
Grade Two....	860.33	348.89	112.50	31.84	803.40	316.44	7.04	1.18	16.53	12.42	57.2	42.6	2.32	.63
Grade Three..	930.24	399.70	111.70	34.84	883.90	369.97	7.73	1.33	15.29	9.37	46.3	37.8	2.18	.60

2

Table 4 continued

Lowest Group

(N=22)

	Total number of words in transcript		Communication units		Total number of words in communication units		Average number of words per communication unit		Mazes		Total number of words in mazes		Average number of words per maze	
	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ	M	σ
Kindergarten.	450.86	363.81	87.40	48.20	399.10	319.51	4.18	1.29	28.03	22.51	54.0	63.4	2.46	1.11
Grade One....	431.91	244.91	69.10	23.43	365.00	190.41	4.89	1.36	27.15	21.35	67.0	72.7	2.65	1.52
Grade Two....	553.86	283.03	89.80	36.34	495.50	252.57	5.49	1.18	23.62	16.27	58.1	53.2	2.52	0.94
Grade Three..	642.95	346.08	90.10	28.51	574.60	305.61	6.08	1.82	23.01	16.91	68.3	55.5	3.17	2.26

Table 5

Consistency of Linguistic Performance:

Correlations of Individual Subject's Amount of Language from Year to Year on Two Measures of Linguistic Performance

Grades being correlated	Average number of words per communication unit	Teacher rating on language ability
Grade One and Grade Two (N=227)......	.728	.842
Grade Two and Grade Three (N=207)......	.741	.816
Grade One and Grade Three (N=207)......	.402	.751
Grade One and Grade Six (N=196)	.324	.657

Correlations significant at the 1% level.*

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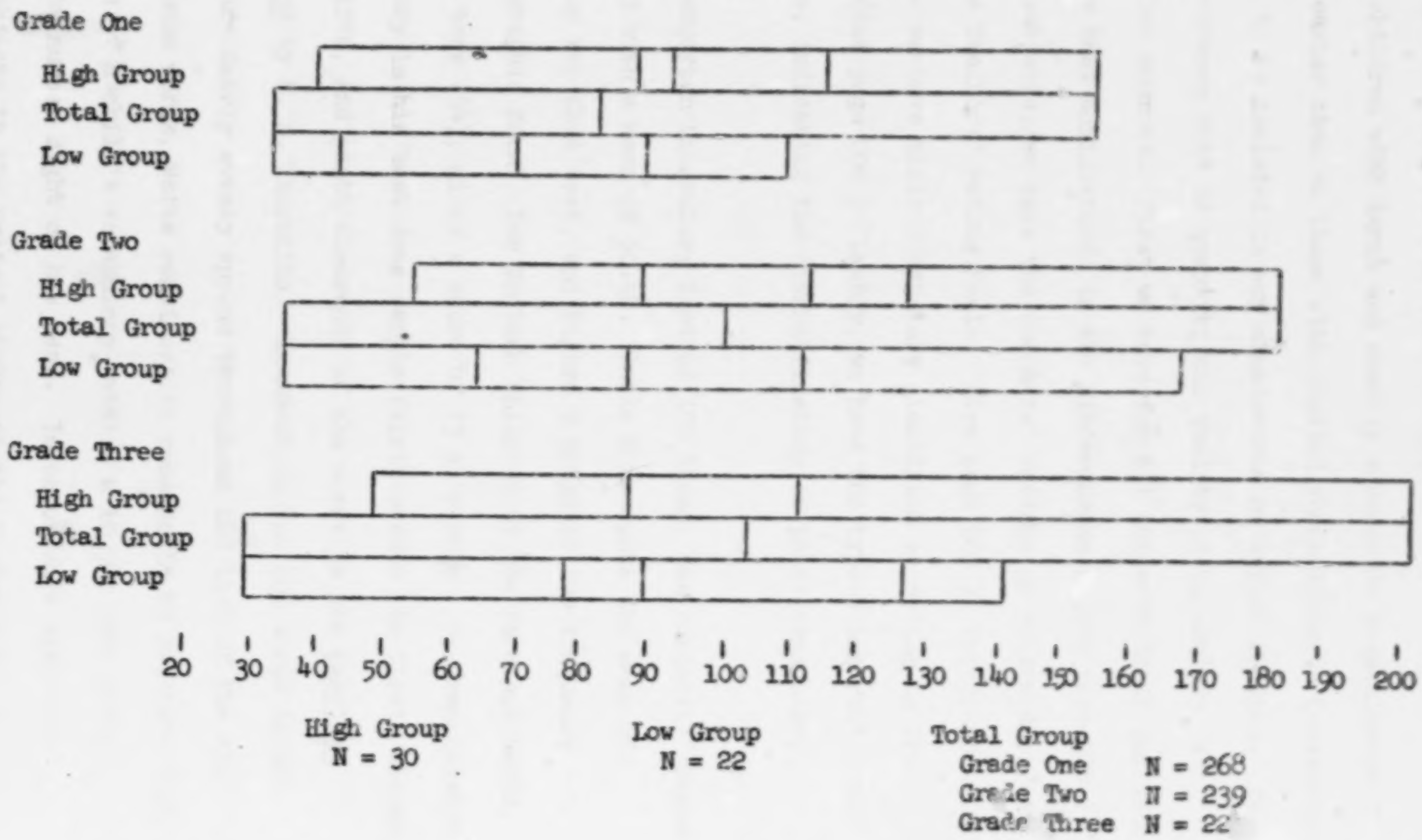
* Determined by consultation of the Wallace and Snedecor Tables. Coefficients of correlation and t ratios significant at the 5 and 1 per cent level for varying degrees of freedom reported in J. P. Guilford: *Fundamental Statistics in Psychology and Education* (New York: McGraw-Hill, 1950), p. 609.

Figure 1

Number of Communication Units for Grades One, Two, and Three

Median and Interquartile Range for Total Group and Two Subgroups



expression from year to year, but those in the high group are more fluent and are gaining greater control over this fluency.

Presumably children with large and readily accessible vocabularies find expression easier than do those with limited vocabularies. Certainly vocabulary ought to be included in any examination of verbal fluency. In this research, evidence both of quantity and quality of vocabulary is available from four sources. First we have for all subjects their position on the vocabulary test administered in the kindergarten. (See page 000.) Second, for all subjects, we have the teachers' ratings on vocabulary, one subsection of the Teachers' Rating Scale. (See page 000.) Third, for the two subgroups we have their vocabulary classified according to frequency of use. (See page 000.) Lastly, we have the type-token ratios for the two subgroups, indicating the diversification of their vocabulary. (See page 000.)

On the Kindergarten Vocabulary Test of 100 items, the subjects' scores vary from 3 to 83 with a mean of 50.46. Table 6 presents the mean and standard deviation for this test, and Figure 2 presents the frequency distribution in graphic form. For British children at the same age Watts, who devised this test (34), gives a score of 53 as a norm. He demonstrates that the vocabulary in his test does sample fairly evenly the first, second, third, fourth, fifth, and sixth thousands of the words in the American Teachers Word Book by E. L. Thorndike. Inasmuch as the 100 words in his vocabulary test are fairly evenly spread throughout the list of the six thousand most common words, Watts considers it reasonable to estimate that the probable size of a child's vocabulary--within a 10 per cent error--is sixty times the number right on his test. In accordance with this reasoning, the subjects in the present study--at the kindergarten level--

vary in vocabulary from 180 to about 5,000 words with 3,000 words as an average.^{22} In comparison with similar results by other research workers such as Smith and Jagger, these figures seem valid. The size of the total vocabulary for children of this age is still a controversial issue, however, and some investigators do not agree with Smith's or Jagger's estimates or their methods of arriving at them. However, in terms of extent of vocabulary, the central tendency and variance show support of the hypothesis that the subjects in this study represent a larger universe of children. In this research, the high and low subgroups were selected by an equally weighted combination of this vocabulary test and the average of seven years' teachers' ratings on language. The median score on the vocabulary test for the high group was 67 and for the low group, 35. For the purposes of validation as well as for evidence on vocabulary, the investigator computed the medians for the low and high groups on the section of the teachers' rating scale which dealt with vocabulary. The median for the high group is 4.51 and for the low group, 1.94.

The frequency of occurrence of English words has been determined and made available in The Teacher's Word Book of 30,000 Words (31). Through a frequency classification of the words used by the low and high subgroups, we can contrast these two groups on range of vocabulary. How many commonly used words appear in their spoken language? Such words will be among the first and second thousands in the Teacher's Word Book. How many unusual words will they use? Such words will be among the higher thousands reported in the Teacher's Word Book. Although allowances will need to be made for the fact that the Thorndike-Lorge count in the Teacher's Word Book is based on written materials, the classification should still be revealing. A few words like television, uncommon at the time of the Thorndike-Lorge

Table 6

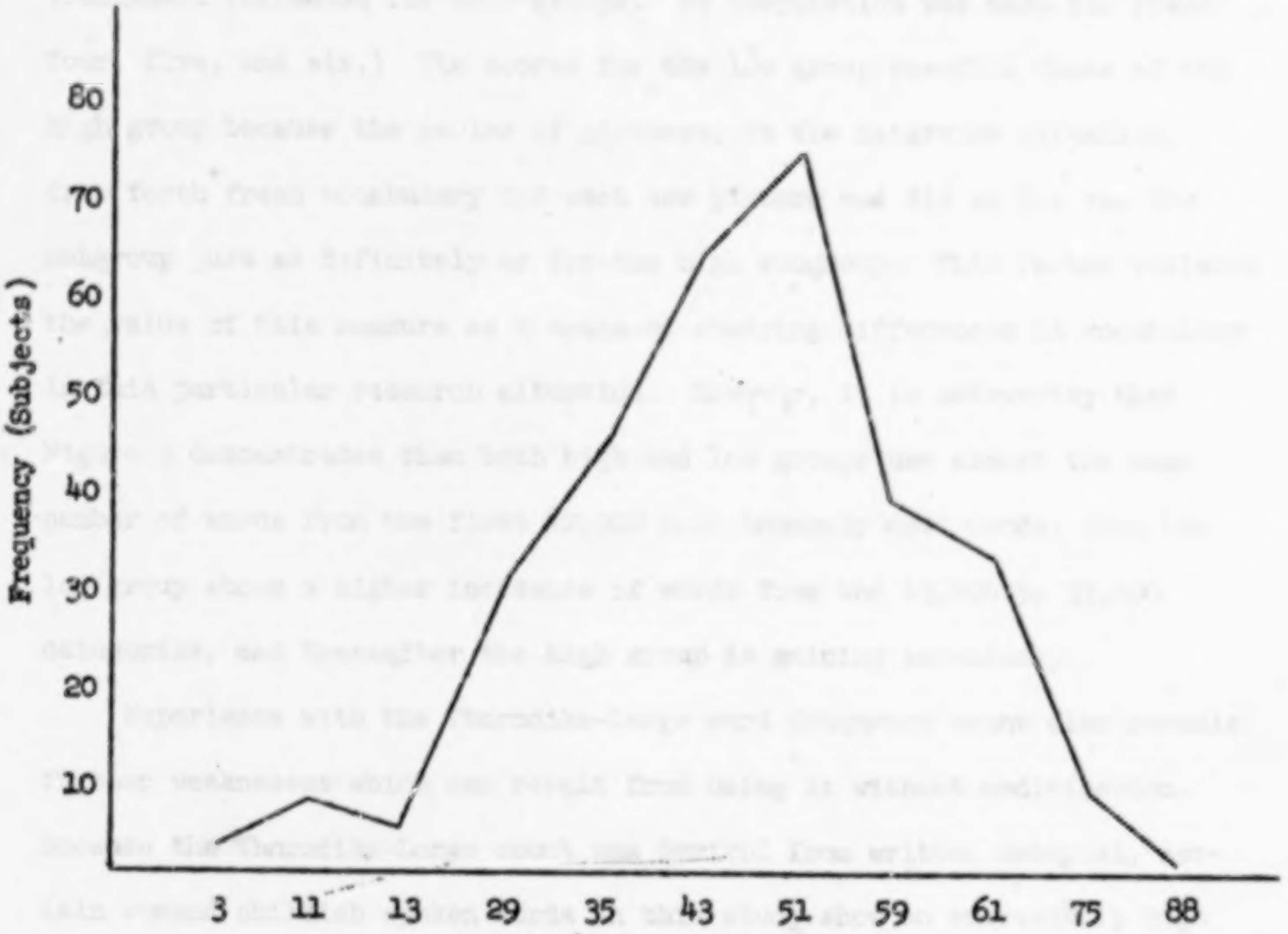
Measures of Central Tendency and Variability Means and Standard Deviations for the Distributions of Total Number of Words Used in Interviews, Total Number of Communication Units in Interviews, Vocabulary and Teacher Rating

Kindergarten Year

	N	Mean	σ
Total no. of words used in interview	270	542.13	348.61
Total no. of communication units used in interview	289	102.25	38.23
Scores on Kindergarten vocabulary test of 100 items	320	50.46	15.35
Teacher rating	317	3.27	0.84

Figure 2

The Frequency Distribution of Vocabulary Scores on the Kindergarten Vocabulary Test (100 items)



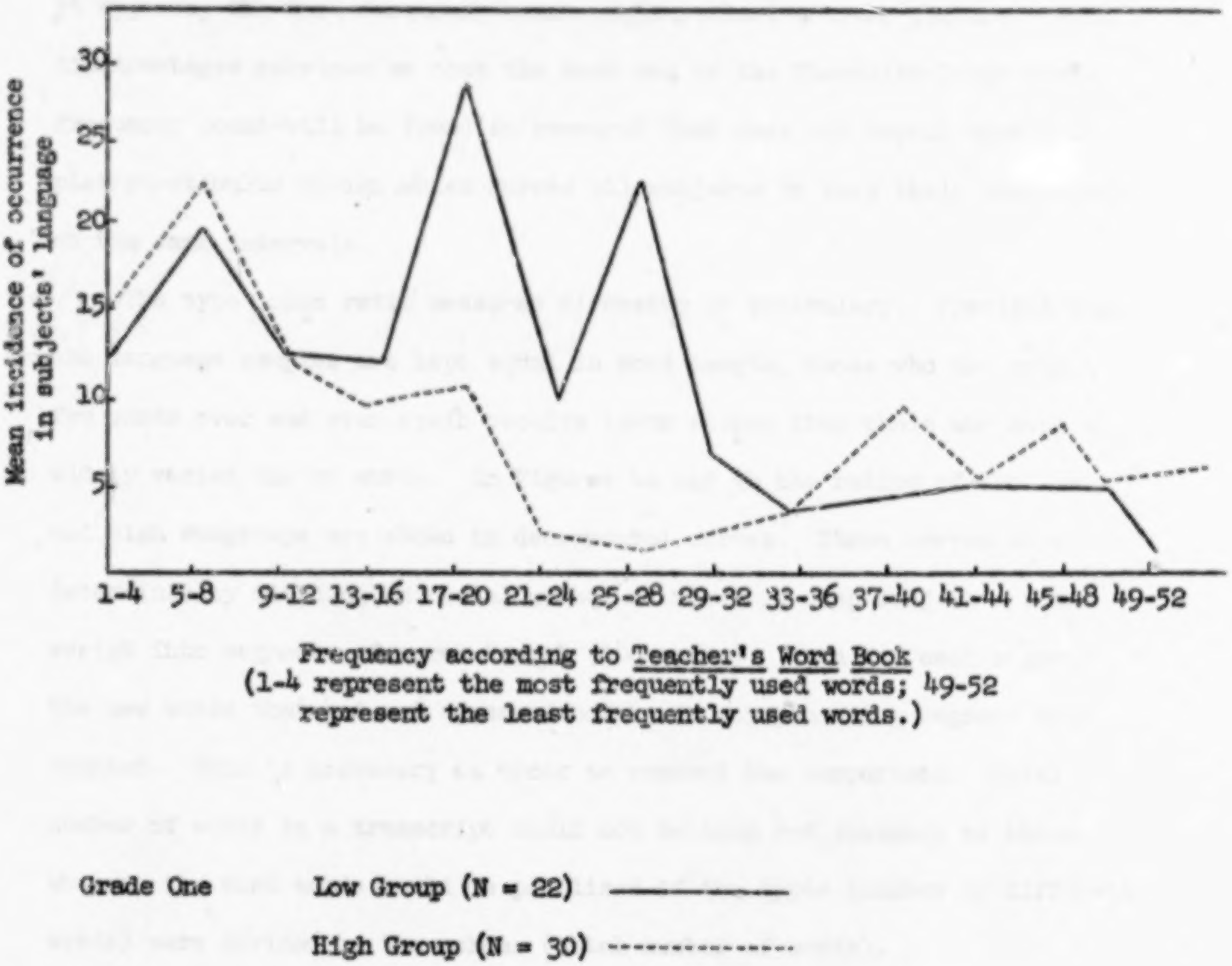
count, will also affect the tally. Nevertheless, the results should conform to the general behavior of word frequency rather than to exceptions. Figure 3 depicts graphically the differences in vocabulary between the low and high groups when their words are classified according to frequency of occurrence among the population at large.

Figure 3 presents the picture for words beyond the first 1,000 and for grade one only. (Grades two and three present almost the same curve with small increases for both groups. No computation was made for grades four, five, and six.) The scores for the low group resemble those of the high group because the series of pictures, in the interview situation, drew forth fresh vocabulary for each new picture and did so for the low subgroup just as definitely as for the high subgroup. This factor vitiates the value of this measure as a means of studying differences in vocabulary in this particular research situation. However, it is noteworthy that Figure 3 demonstrates that both high and low groups use almost the same number of words from the first 12,000 most commonly used words; then the low group shows a higher incidence of words from the 13,000 to 33,000 categories, and thereafter the high group is gaining ascendancy.

Experience with the Thorndike-Lorge word frequency count also reveals further weaknesses which can result from using it without modification. Because the Thorndike-Lorge count was derived from written material, certain common childish spoken words in this study show an excessively high rating: e.g., O.K., bunny (rabbit). Proper names, used often both by low and high subgroups, fall into the least common category and are best omitted in such a study as this. Some subjects in the low group are so weak in language power that they, like small children in the earliest stages of language, repeat over and over again the words they stumble upon to

Figure 3

Vocabulary of Low and High Subgroups in Grade One:
Classified According to Frequency of Word Use in the General Population*



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* According to the Teacher's Word Book of 30,000 Words by E. L. Thorndike and I. Lorge. New York: Bureau of Publications, Teachers' College, Columbia University, 1944.

express themselves. Thus one subject, exceptionally poor in language, repeated bunny twelve or thirteen times, running his score on non-frequent words much higher than his fellow first graders who had greater control over language. By counting such compulsive language only the first time it appears, the word-frequency count could reflect a truer picture. Such disadvantages convince us that the best use of the Thorndike-Lorge word-frequency count will be found in research that does not depend upon a picture-stimulus design which forces all subjects to vary their vocabulary at the same intervals.

The type-token ratio measures diversity of vocabulary. Provided that the language samples are kept equal in word length, those who use only a few words over and over again receive lower scores than those who have a widely varied use of words. In Figures 4a and 4b the ratios of the low and high subgroups are shown in decremental curves. Those curves were determined by dividing the total number of words in each subject's transcript into segments of equal length (100 words). Then for each segment the new words that had not appeared before in any preceding segment were counted. This is necessary in order to control the comparison. Total number of words in a transcript could not be compared inasmuch as those who use the most words would be penalized if the types (number of different words) were divided by the tokens (total number of words).

In spite of attempts to adapt the Thorndike-Lorge frequency count and the type-token ratio to the uses of this research, the findings do not discriminate notably between the low and high subgroups. Figures 4a and 4b show that except for the larger number of words used by the high group, both groups reveal the same incidence of new words in each new segment of 100 words. In the case of the type-token ratio, the fault lies again in

Figure 4a

Diversity of Vocabulary for Low Subgroup

as Measured by the Type-Token Ratio

N = 22

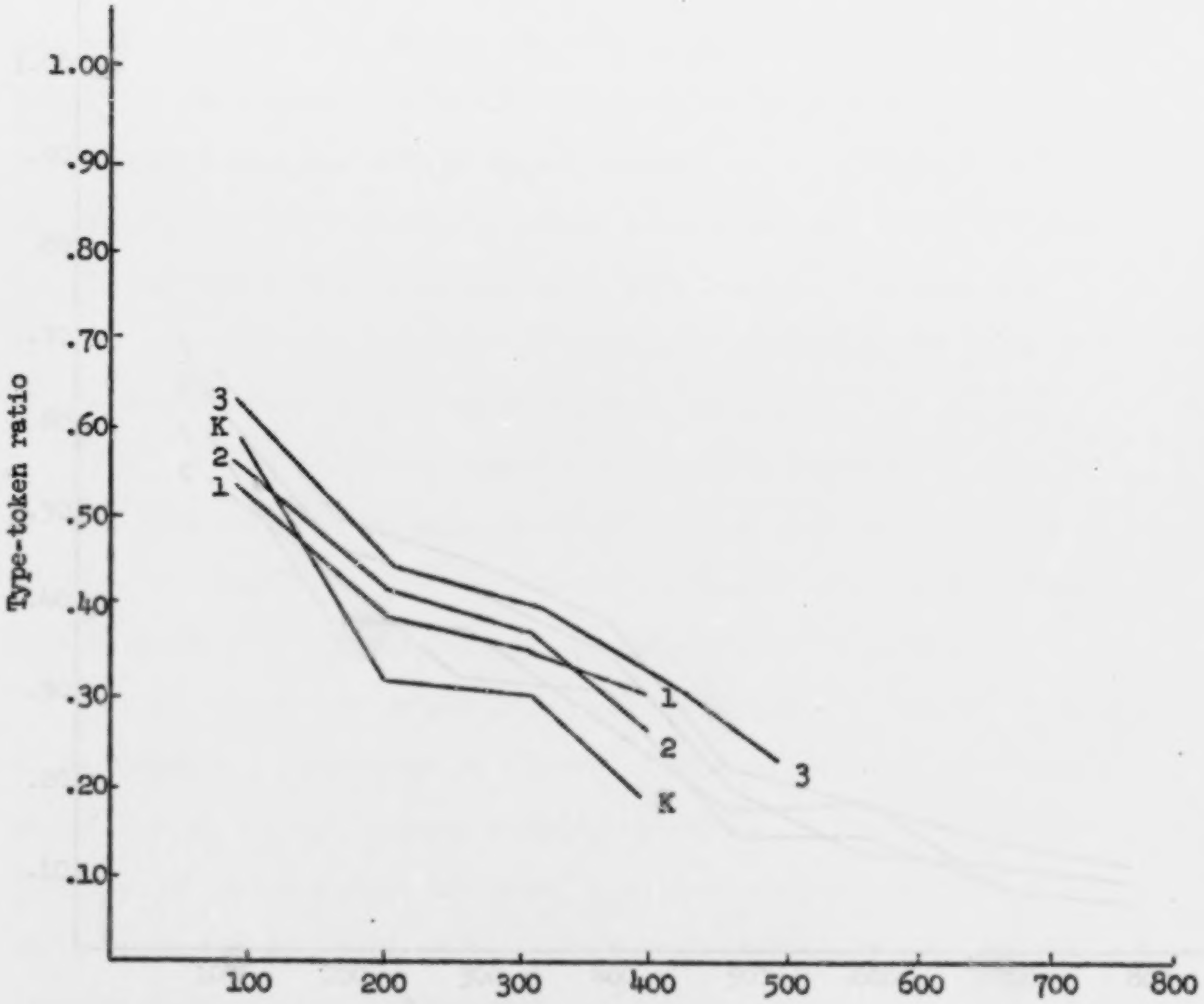
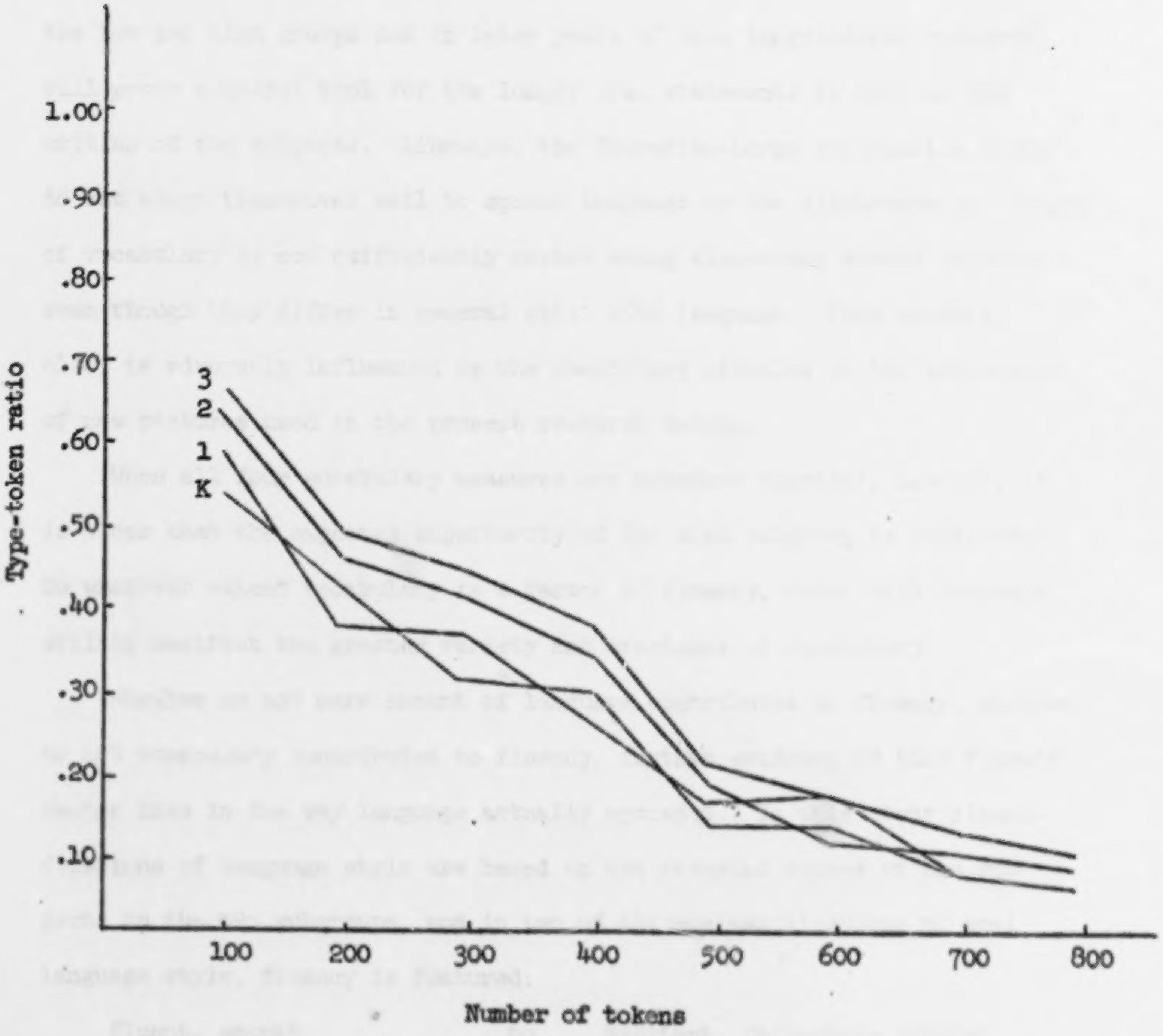


Figure 4b

Diversity of Vocabulary for High Subgroup

as Measured by Type-Token Ratio

N = 30



the particular language situation sampled in this research. In this particular situation, the subjects are viewing six new pictures by the time they reach the third, fourth, and fifth hundred words. Each picture stimulates, alike in low or high subgroups, a new vocabulary. In a different language sample, the type-token ratio would discriminate between the low and high groups and in later years of this longitudinal research will prove a useful tool for the longer oral statements as well as the writing of the subjects. Likewise, the Thorndike-Lorge frequencies either do not adapt themselves well to spoken language or the difference in "height" of vocabulary is not sufficiently marked among elementary school children--even though they differ in general skill with language. This measure, also, is adversely influenced by the vocabulary stimulus of the succession of new pictures used in the present research design.

When all four vocabulary measures are examined together, however, it is clear that the expected superiority of the high subgroup is consistent. To whatever extent vocabulary is a factor in fluency, those with language ability manifest the greater variety and exactness of vocabulary.

Whether or not mere amount of language contributes to fluency, whether or not vocabulary contributes to fluency, further evidence of this fluency factor lies in the way language actually operates. In this study classifications of language style are based on the recorded voices of the subjects in the two subgroups, and in two of these classifications of oral language style, fluency is featured:

fluent, smooth	to	hesitant, faltering, labored
readiness, fullness of response	to	meagerness and slowness of response

To find out whether or not those low or high in language ability tended to be different from the total group in respect to these classifications, the investigation employed the chi-square test. Rather than assume the null hypothesis or to estimate theoretical frequencies, the investigator used the table of random numbers to select an equal number of subjects from the total sample. Those members from the total sample, selected thus at random, were then classified by the same methods used for the low and high subgroups, and the resulting scores were used to replace theoretical frequencies in the computation of chi-square.

That the high subgroup is significantly more fluent than the total sample appears in Table 1a (page 36). However, their readiness of response, as appears in Table 7a, does not prove to differ from the random group. The low group proves to be more hesitant than the rest of the subjects in this study (see Table 1b on page 37) and they may be somewhat more slow of response. (See Table 7b.) The results need to be considered only tentative inasmuch as cells with less than six cases occur frequently among the results for the empirical group.

SUMMARY ON FLUENCY

To summarize the evidence on fluency, then, these subjects, over a period of seven years, increase the amount of language they use in the same controlled situation and, by reducing the number and size of their mazes, gain an increase of smoothness in their expression. Those who are rated high on language ability appear to be superior to the total sample for fluency and readiness of response, and they use more words in each year of the study than do those low in language ability. The high group also has a larger, more varied, and more readily accessible vocabulary.

Table 7a

LINGUISTIC STYLE: READINESS OR SLOWNESS OF RESPONSE

Application of Chi-square to Scores of 25 Subjects

Identified as High in Language Skill

(Scoring by Judge Number One: V.S.)

Rating (on recordings for grades 4, 5, and 6)	Empirical frequency 25 subjects drawn at random from total group	Frequency for 25 subjects in high group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Ready response	15	21	6	36	2.40
Average	4	4	0	0	0.00
Slow response	6	0	-6	36	2.40
Total	25	25			

χ^2=4.80

significant at 10% level

(Scoring by Judge Number Two: L.L.)

Rating (on recordings for grades 4, 5, and 6)	Empirical frequency 25 subjects drawn at random from total group	Frequency for 25 subjects in high group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Ready response	18	21	3	9	.50
Average	7	4	-3	9	1.29
Slow response	0	0	0	0	0
Total	25	25			

χ^2=1.79

not significant

Table 7b

LINGUISTIC STYLE: READINESS OR SLOWNESS OF RESPONSE

Application of Chi-square to Scores of 24 Subjects
Identified as Low in Language Skill

(Scoring by Judge Number One: V.S.)

Rating (on recordings for grades 4, 5, and 6)	Empirical frequency 24 subjects drawn at random from total group	Frequency for 24 subjects in low group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Ready response	16	10	-6	36	2.25
Average	8	10	2	4	0.50
Slow response	0	4	4	16	0
Total	24	24			

In a three-cell table with two degrees of freedom, a X^2 of 2.40 is significant at only the thirty per cent level of confidence. $X^2=2.75$

(Scoring by Judge Number Two: L.L.)

Rating (on recordings for grades 4, 5, and 6)	Empirical frequency 24 subjects drawn at random from total group	Frequency for 24 subjects in low group	(AF-TF)	$(AF-TF)^2$	$\frac{(AF-TF)^2}{TF}$
Ready response	17	9	-8	64	3.77
Average	7	12	5	25	3.57
Slow response	0	3	0	0	0
Total	24	24			

In a three-cell table with two degrees of freedom, a X^2 of 7.82 is significant at the two per cent level of confidence. $X^2=7.34$

They reduce the incidence of their mazes by 35 per cent and are also reducing the total number of words in mazes and the average number of words in mazes. The low group, on the other hand, despite the fact that it uses fewer words, is increasing the total number of words and average number of words in mazes, even though it is reducing the incidence of mazes by 18 per cent. It would appear that members of the low group experience more difficulty in gaining control of the patterns of English syntax and therefore involve themselves in more language tangles or mazes than does the high group. The mazes certainly reduce fluency, whatever the cause for them may be. The low group says less, has more difficulty in saying it, and has less vocabulary with which to express what it says. There is a significant tendency for all subjects in the sample to maintain a consistent position in the group when fluency (as measured by the average number of words per communication unit) is measured from year to year.

EFFECTIVENESS AND CONTROL

Words and readiness with them are part of power over language, but unless a speaker or writer imposes a purposeful order upon such fluency, his language is likely to be prolix drivel or chatter. Consequently the findings bearing upon effectiveness and control of language, presented in this section, are highly important to the purpose of this study. Evidence on effectiveness and control has been drawn together from a number of sources:

... ability to use and vary the structural patterns of English
(First Level Analysis)

... dexterity in varying elements within the structural patterns
(Second Level Analysis)

... mastery of conventional usage and grammar

... ability to express tentative thinking by means of provisional or conditional statements

... competence with reading and writing

... coherence through the use of subordination

... coherence through use of subordinating connectives

... coherence through control of mazes

... coherence of spoken style

All in all, at least nine measures in this study will provide evidence on the subjects' effectiveness and control. Logically these measures provide a reasonably comprehensive description of language effectiveness and control.

First Level Analysis

Ability to use and vary the structural patterns of English

The subjects' oral language was analyzed for evidence on ability to use and vary nine basic structural patterns of English. Each communication unit was classified and tallied as shown in Tables 8a and 8b. Because the high group used more language, the results in Table 8 have been computed in per cent of total amount of language in order to make the two groups comparable. Per cents have been rounded out to two figures. The tables yield the following evidence:

... The low group uses many more partial communication units (units that are incomplete, for one reason or another) than the high groups. For both groups the per cent of partials decreases with chronological age.

... The high group uses more linking verb units (1②5).

Table 8a

First Level Analysis: High Group N = 25

Relative Proportions of Structural Patterns

Showing Median, First Quartile, and Third Quartile

According to Per Cent of Pattern Used in Total Transcripts for Seven Years

Pattern

	High	1 2			1 2 4			1 ② 5			1 2 3 4			1 2 4 6			1 ② 1		
	N=25	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3
Grade	K	21	24	21	30	27	29	10	11	13	0	1	1	0	0	1	2	3	5
	1	20	21	21	36	37	33	10	16	15	0	0	1	0	0	1	2	3	5
	2	19	21	23	33	34	32	15	17	18	0	0	1	0	0	0	3	7	7
	3	22	20	24	38	38	33	12	17	17	0	0	1	0	0	1	6	5	6
	4	25	27	24	38	36	36	20	17	17	0	2	2	0	0	1	4	5	5
	5	25	28	27	41	35	32	13	18	16	1	1	1	0	0	1	2	3	4
	6	29	28	29	38	39	38	16	15	16	1	1	2	0	1	1	1	2	3

Pattern

	High	WQ			Passive			Partial		
	N=25	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3
Grade	K	0	0	1	0	0	0	38	34	30
	1	0	0	1	0	0	1	32	24	24
	2	0	0	1	0	0	1	25	21	22
	3	0	0	1	0	0	1	21	19	19
	4	0	0	1	0	0	1	14	13	13
	5	0	0	0	1	1	1	15	13	18
	6	0	0	0	0	1	1	14	14	11

Table 8b

First Level Analysis: Low Group N = 24

Relative Proportions of Structural Patterns

Showing Median, First Quartile, and Third Quartile

According to Per Cent of Pattern Used in Total Transcripts for Seven Years

Pattern

	Low	1 2			1 2 4			1②5			1 2 3 4			1 2 4 6			1②1		
	N=24	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3
Grade	K	19	23	21	22	26	28	5	6	9	0	0	1	0	0	0	0	0	1
	1	20	25	23	17	26	32	6	7	10	0	0	1	0	0	0	0	0	3
	2	25	25	21	27	31	32	9	10	11	0	0	1	0	0	0	1	4	3
	3	24	24	24	27	33	30	10	10	12	0	0	2	0	0	1	1	2	4
	4	23	27	27	37	36	34	12	11	14	0	0	1	0	0	0	0	2	3
	5	26	28	26	37	34	33	11	12	11	0	1	2	0	0	1	3	4	4
	6	31	28	31	34	36	34	14	12	11	1	2	3	0	0	0	1	2	3

Pattern

	Low	WQ			Passive			Partial		
	N=24	Q_1	Md	Q_3	Q_1	Md	Q_3	Q_1	Md	Q_3
Grade	K	0	0	3	0	0	0	54	45	38
	1	0	0	1	0	0	0	58	42	32
	2	0	0	1	0	0	0	38	30	30
	3	0	0	0	0	0	1	37	31	27
	4	0	0	0	0	0	1	27	23	20
	5	0	0	0	0	0	1	24	22	21
	6	0	0	0	0	1	1	20	18	18

... The 1②1 pattern (there is, it is, there are) increases and then decreases for the high group; it is never used very much by the low group.

... The outer complement (1 2 4 6) is used only by the highest of the high group.

... The inner complement (1 2 3 4) is seldom used by either group and appears not to be a frequent pattern in English, certainly not among children.

... The passive pattern is employed only slightly by the high group, although examination of the transcripts shows that all the subjects use the passive occasionally.

... Except for pattern 1②5 and the use of partials, differences between high and low groups are not notable.

Second Level Analysis

Dexterity in varying elements within the structural patterns

All these subjects--high, random, or low--are familiar with the relatively few structural patterns of the English language. Thus structural pattern reveals less remarkable differences than does dexterity of substitution *within* the patterns. The important differences show up in the substitution of word groups for single words, in the choice and arrangement of movable syntactic elements, in variety of nominals, and in strategies with predication. Here the subjects' differences are much greater, as may be seen in Tables 9, 10, and 11.

Movables

Essential sentence elements, those which determine the structural patterns in the First Level Analysis, occupy fixed positions. In English, word order determines meaning. English speakers can say Mary ate the rhubarb (1 2 4) but they cannot say The rhubarb ate Mary and make sense. Because English is not an inflected language--such as Latin--it has no 4 2 1 pattern. The essential sentence elements, then, have a fixed order in our language.

There are, however, some less essential elements which are relatively unfixed, adverbial modifiers like usually, in the meantime, and if you don't really like it. In this study these have been classified as words, phrases, clauses, and multiple constructions (movables within movables such as holding the clowns in his hands or whoever in the excitement manages to keep from laughing). The high group and the low group show little difference in the use of words and phrases as movables, but as will be seen by their medians in Table 9, the high group consistently shows a greater repertoire of clauses and multiples used as movable elements in the sentence. The number of movable types in their transcripts have been converted to per cent of totals in order to make direct comparison possible between the two groups.

Nominals used as subjects

As will be seen by Table 10, high and low groups use nouns and pronouns almost exclusively for sentence subjects and both groups do so in about the same proportions. The medians for both groups do not, however, reveal the fact that the high group exceeds the low group in its actual incidence of more complicated constructions used as subjects. The following figures represent what happens when complicated constructions are tallied.

	High	Low
Verbals	13	1
Infinitives	18	3
Prepositional phrases	5	4
Clauses	28	0
Total	64	8

Table 9

Dexterity in Varying Elements Within Structural Patterns: Movables

Median of High and Low Groups in Per Cent of Various Movables Used

High Group = 25 Low Group = 24

Grade	Group	Words	Phrases	Clauses	Multiples
K	High	.362	.453	.099	.050
	Low	.346	.543	.059	.000
1	High	.357	.476	.096	.030
	Low	.395	.478	.061	.000
2	High	.361	.494	.127	.044
	Low	.416	.459	.070	.006
3	High	.413	.451	.102	.031
	Low	.376	.484	.684	.020
4	High	.347	.478	.113	.051
	Low	.386	.477	.050	.022
5	High	.359	.474	.111	.047
	Low	.382	.469	.098	.032
6	High	.370	.494	.107	.046
	Low	.379	.480	.038	.033

Table 10

Dexterity in Varying Elements Within Structural Patterns: Nominals Used as Subjects

Median of High and Low Groups in Per Cent of Varieties of Nominals

High Group = 25 Low Group = 24

Grade	Group	Nouns	Pronouns	Verbals	Infinitives	Prep. Phrases	Clauses
K	High	.188	.808	0	0	0	0
	Low	.188	.812	0	0	0	0
1	High	.237	.760	0	0	0	0
	Low	.258	.742	0	0	0	0
2	High	.225	.775	0	0	0	0
	Low	.240	.760	0	0	0	0
3	High	.232	.768	0	0	0	0
	Low	.260	.740	0	0	0	0
4	High	.186	.814	0	0	0	0
	Low	.231	.769	0	0	0	0
5	High	.177	.813	0	0	0	0
	Low	.274	.726	0	0	0	0
6	High	.242	.755	0	0	0	0
	Low	.232	.768	0	0	0	0

In the low group, during the years from kindergarten through grade six, there occur only 8 instances of subject nominals more complicated than a noun or pronoun. Of these half are prepositional phrases and none are clauses. The boys in the low group contributed only 2 of the 8 instances (2 infinitives).

Nominals used as complements

For nominals used as complements the same situation develops. Both groups, as can be seen in Table 10, use nouns and pronouns as complements in about the same frequency. The difference lies in the use of infinitives and clauses where the high group invariably exceeds the low group.

Because many subjects did not use verbals or prepositional phrases as complements, the median again does not reveal any differences. However, the actual incidences occurring in the two groups for seven years does differ as follows.

	High		Low	
	boys	girls	boys	girls
Verbals	39	49	19	34
Prepositional phrases	57	22	14	26
Total	96	71	33	60

As usual, the boys in the low group are the ones who have the smallest repertoire, the least dexterity. Also, the interesting and increasing phenomenon of boys exceeding the girls in the high group occurs one more time.

Nominals used as objects of prepositions and verbals

As in the previous analyses, the high group exceeds the low group in using any form of nominal except the single noun or pronoun. Nouns amplified by modifiers, compound nouns, clauses, infinitives--all these characterize the high group rather than the low group. Once again the high boys manifest slightly greater flexibility than the high girls and

Table 11

Dexterity in Varying Elements Within Structural Patterns:

Nominals Used as Complements

Median of High and Low Groups in Per Cent of Varieties of Nominals

High Group = 25 Low Group = 24

(Complements tallied represent direct and indirect objects, predicate nominatives, and object complements.)

Grade	Group	Nouns	Pronouns	Verbals	Infinitives	Prep. Phrases	Clauses
K	High	.586	.220	0	.090	0	.083
	Low	.536	.296	0	.042	0	.028
1	High	.624	.190	0	.057	0	.080
	Low	.678	.178	0	.036	0	.047
2	High	.596	.218	0	.081	0	.111
	Low	.608	.246	0	.052	0	.054
3	High	.565	.217	0	.095	0	.104
	Low	.655	.221	0	.047	0	.073
4	High	.507	.231	0	.090	0	.127
	Low	.581	.240	0	.065	0	.074
5	High	.508	.223	0	.108	0	.131
	Low	.540	.252	0	.084	0	.072
6	High	.519	.226	0	.116	0	.128
	Low	.506	.243	0	.096	0	.088

the low boys are more restricted in their repertoires than are the low girls.

Mastery of conventional usage and grammar

Effectiveness with language often requires an ability to use those conventions which characterize standard English, a term defined by Fries as "a set of language habits in which the major matters of the political, social, economic, educational, religious life of this country are carried on."

> To these language habits is attached a certain social prestige, for the use of them suggests constant relations with those responsible for the important affairs of our communities. It is this set of language habits . . . which is the "standard" not because it is any more correct or more beautiful or more capable than other varieties of English; it is "standard" solely because it is the particular type of English used in the conduct of the important affairs of our people. It is also the type of English used by the socially acceptable of most of our communities, and insofar as that is true it has become social or class dialect in the United States (37).

This definition of standard English requires caution of anyone who classifies errors in the speech of a sample such as the children in this research. By this definition, much that school texts present for correction is not error, for superior writers and speakers--even those of prestige--manifest language habits the texts do not accept. In this research, therefore, errors are defined as major variations in usage and structure and to identify these major variations, we have relied upon the research of Leonard (36), Fries (37), Marckwardt and Walcott (38), as well as the recommendations of Pooley (39).

The analysis of usage and grammar in this research, lengthy enough to be a monograph by itself, has not been completed for all pupils, but a special study of two groups is in final form and is presented here.

In tallying nonstandard language, the research analyst soon became aware that verbs--and in particular, agreement of verbs with subjects--represented the major category of deviation from convention. In the recorded interviews, communication units such as the following occurred frequently:

The boy have a shirt on.
He seen a robber.
The clown are holding a man.
Yes, you is.
There's tears coming down her face.
I writed it (a common type of deviation in which the kindergarten or first grade subject is applying logically the prevailing pattern of past tense for the English language).

Another special problem with verbs proved to be the omission of auxiliaries with the present participle:

She picking up the gopher.
That man dancing with the girl.
He going home now.

This latter special problem appeared most often in the transcripts of Negro children, most of whom had been born in the South or whose parents had been born in the South. The problem is very likely one of special acculturation and, from the evidence, dissolves as these particular subjects extend their experiences beyond the home and neighborhood. Most of the users were from the least-favored socio-economic classification. Other Negro subjects, whose average background rated middle-class, used the auxiliary verb appropriately.

In order to study this problem more thoroughly, 25 Negro boys and 25 Negro girls--born in the southern states or with parents who were born in those states--were matched with the same number of Caucasian boys and girls who had no direct contact with southern speech, either by birth or through parental influence. The two groups were matched as closely as possible for sex, intelligence test scores, and socio-economic status.

Their deviations from conventional usage were classified and studied for grades one, two, and three. On 5 uses of the verb, 3 of the pronoun, and 2 of conventional usage, the differences between the two groups were sufficiently pronounced to deserve attention. These differences and their incidence are presented in Table 12. The categories of deviation from standard English on which the two groups differed are illustrated by the following examples:

Verb

Omissions of various forms of the verb to be

Examples:

She picking up a rabbit.
She happy.
He a man.
She in the house.

Omission of the auxiliary have

Examples:

I seen it.
He gone away.

Use of got instead of have to denote possession

Examples:

He got a book.
I got a sister.

Use of present tense for the past

Example:

He give me a dollar yesterday.

Lack of subject-verb agreement

Examples:

He go away.
The boy fall down.
There's two girls in the picture.
He be happy.
They is going.

Table 12

Deviations from Conventional Grammar and Usage in Grades 1, 2, and 3

Comparing Two Groups Matched for Sex, Socio-economic Status and Intelligence Test Scores

	Northern Caucasians (both parents born in North)								Southern Negroes (both parents born in South)								Over-all Totals	
	Boys N=25				Girls N=25				Boys N=25				Girls N=25				N C	S N
	Grade				Grade				Grade				Grade					
	1	2	3	Total	1	2	3	Total	1	2	3	Total	1	2	3	Total	N = 50	N = 50
Verb:																		
Lack of subject-predicate agreement	39	30	36	105	32	67	58	157	114	130	190	434	154	159	126	439	262	873
Omission of to be	15	6	5	26	14	6	3	23	126	143	118	387	66	94	67	227	49	614
Use of got to show possession	23	13	14	50	10	11	10	31	36	110	87	223	74	70	26	170	81	393
Use of present tense to express past	4	2	6	12	7	9	6	22	24	25	41	90	6	44	11	61	34	151
Omission of auxiliary have	3	0	1	4	3	0	2	5	6	11	9	26	10	2	4	16	9	42
Pronoun:																		
Case																		
Nominative for possessive	1	0	0	1	0	0	0	0	6	6	5	17	1	1	5	7	1	24
Objective for nominative	2	4	5	11	4	1	7	12	19	16	12	47	4	4	7	15	23	62
Hisself for himself	5	3	1	9	4	1	0	5	4	10	4	18	3	7	3	13	14	31
Usage:																		
Double negative	7	2	1	10	1	2	0	3	13	22	15	50	22	21	16	59	13	109
"The man he--"	13	12	25	50	33	26	52	111	25	49	83	157	27	39	57	123	161	280

Pronoun

Use of the nominative case for the possessive

Example:

This is they house.

Use of the objective case for the nominative

Example:

Me and him went.

Use of hisself for himself

Example:

He hurt hisself.

Usage

The double negative

Examples:

He didn't live there no more.
I didn't do nothing.

The noun-pronoun subject

Examples:

The man he's going.
The woman she was sick.

Problems with verbs prove to be the most frequent. One of these--subject-predicate agreement--is the major source of difficulty for both groups. For the Negro child with southern background, using the verb to be appropriately proves to be twelve times as troublesome as for the northern Caucasian subjects. The use of got to show possession, next in order of frequency, seems less serious, but confusion of present with past tense impresses one as another difficulty to be attacked in the middle grades as well as earlier. By noting the incidence of southern Negro's errors in relation to those of the northern Caucasian, the reader can locate those deviations that will require the greatest help in schools with a number of Negro children similar to this group. For instance, the use of the nominative pronoun for the possessive shows a larger differential than hisself for himself.

Analysis of the nonconventional statements of the total sample for all seven years of this study shows subject-predicate agreement to be the major source of difficulty. That sensitivity to the conventions of standard English is related to skill in language will be seen in the significant differences on conventional usage in Tables 17a and 17b. The high group is significantly superior to the random group and the low group significantly below the random group. The results are significant at the one per cent level for both judges, and this finding occurs in various ways throughout the study.

Ability to express tentative thinking by means of provisional and conditional statements

Ineptness with language is far less serious than malicious perjury or slander, no matter how skillfully or beautifully phrased. The purposes for which human beings use language deserve study. For children's language, as for all language, function is still relatively uncharted. Piaget's disputed analysis of function finds children's language to be primarily egocentric before age seven or eight and more social in nature after age eleven or twelve. Rugg and others (27) evolved a different set of functional categories: linguistic experimentation, verbalized perceptions, self-assertion, and statements of fact, among the most common. Other experimenters have noted requests, threats, criticism, commands, and questions. In the present study tentative thinking proved to be a function of language which distinguished effective and ineffective users of language. Apparently the functions of language are varied and numerous, even in childhood.

Results of all research into function of language depend upon the situation from which language samples are derived. Only when two language investigations sample similar situations will their classification of function be comparable. This points up a limitation of all research into language, including the present study. Until comprehensive long-range research into children's language can be financed or devised, we cannot sample the same subjects over a long-range dimension of time nor can we record samples of the subjects' language _in a wide variety of situations_. In the present research, the language sample was secured in an interview-situation identical for all subjects. In such a context, opportunities for such functions as threats, commands, or deception are negligible. In another situation the findings on vocabulary, usage, and style might differ considerably; certainly the functions of language would vary.

Despite the limitations expressed above, the analysis of linguistic function in this research does reveal one fact of considerable interest. Those subjects who proved to have the greatest power over language--by every measure that could be applied, not just by the combined Teachers' Rating Scale and Vocabulary Test--were _the subjects who most frequently used language to express tentativeness_. Supposition, hypotheses, and conditional statements occur much less frequently in the language of those subjects lacking skill in language.

The low subgroup furnishes only a few examples of this use of language whereas the high subgroup uses language in this way from the kindergarten

Table 13

Functions of Language: Classification of Low and High Subgroups in Eight Categories of Language Function

(High N = 25) (Low N = 24)

Figures Represent Averages for Each Group

Functions of language in a sample drawn from oral interview	School Year								Total for four years	
	Grade Three		Grade Four		Grade Five		Grade Six			
	Low	High	Low	High	Low	High	Low	High	Low	High
Statement of facts	23	43	25	48	34	49	46	52	128	192
Interpretations of fact	17	26	16	21	19	19	24	34	76	100
Personal associations	0	16	10	17	11	19	13	21	34	73
Tentative statements	3	28	5	31	7	49	12	51	27	159
Generalizations	0	2	3	8	5	13	7	15	15	38
Irrelevancies	8	2	9	7	9	4	8	0	34	13
Questions	1	5	7	3	3	2	5	4	16	14
Figurative language	0	5	3	12	0	11	5	13	8	41

The sample was composed of 70 communication units drawn from the answer on television and on the six pictures for grades four, five, and six.

year through the sixth grade, employing such words as "perhaps" and "maybe" more often than do the subjects who have difficulty in expressing themselves. These most capable speakers often use such expressions as the following:

> It might be a gopher, but I'm not sure.
> That, I think, is in Africa.
> But maybe they don't have any dogs in Alaska.
> I'm not exactly sure where that is. It looks like it might be at school.
> That's white grass--unless there's snow or the sun is reflecting.

The child with less power over language appears to be more dogmatic in his speech, is not often capable of seeing more than one alternative, and apparently summons up all his linguistic energies merely to make a flat statement.

In addition to the findings on tentativeness, Table 13 shows that relatively few examples of generalization or figurative language appear in the language of these subjects. The situation from which the language samples were drawn was one in which generalization was entirely possible. Equally surprising are the few examples of figurative language. A few subjects in the high subgroup and in the total group noted that the rounded top of a fence looked like little hills or that a girl about to cry had a face that was clouding up. The situation from which these language samples were drawn offered, it was believed, exceptionally good opportunity for subjects to use figurative language as well as generalizations.

Competence with reading and writing

Several methods of appraising competence in reading and writing were used in this research. The indices of reading and writing, described on pages 44-46 in Chapter Two, were two methods of appraisal. The subjects' scores on the reading achievement tests and an improved version of the writing index mentioned above represent further methods of appraisal.

Reading

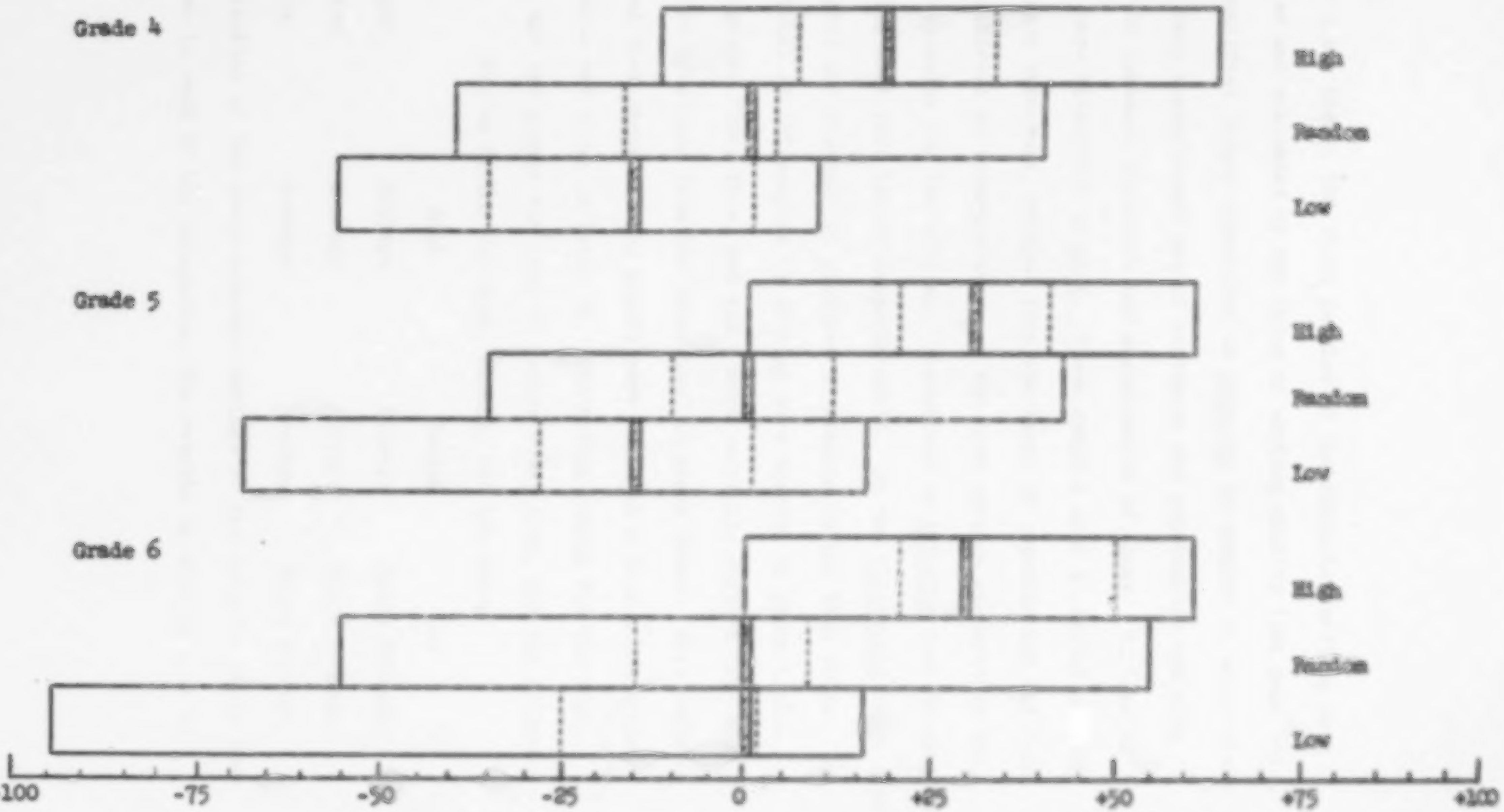
In reading, the subjects' progress in the second and third grades of school was assessed by a reading index. The results for both grades two and three fall into a curve very close to a normal curve. A T-Test of the differences between the means of the two groups high and low in language ability shows, as might be expected, a significant difference in favor of the high group.

For children in the primary grades reading is still very often something one is learning in school. Out of the 221 third grade subjects, 36 per cent received credit on the Index of Reading Ability for reading children's recreational books of their own choosing. The other 64 per cent had not yet progressed beyond the instructional readers required by their teachers. Evidence on the recreational reading of the subjects has been collected for grades four, five, and six but has not yet been studied.

Beginning in grade four and continuing in grades five and six, scores on the Stanford Achievement Test in Reading were available. Figure 5 presents the scores for the high, random, and low groups as charted for each of these three grades. It shows that those who are proficient in oral language (the basis of group selection) are also those who are superior in reading achievement; in all quartiles, the high subjects are above their chronological age in reading achievement. By grade six they are all above their age expectation. The random group, at their median are just at the level expected of them for their age. Many in the low group, fall increasingly behind but a great many, clustering just above the age-grade mean manage to pull the mean up to that of the random group.

Figure 5

Reading Achievement Tests: Grades 4, 5, and 6 with a Comparison of High, Random and Low Groups



+ = Number of months reading achievement age is above chronological age.
- = Number of months reading achievement age is below chronological age.

Writing

In grade three, the first samples of the subjects' writing were collected and evaluated by the index of writing ability (see page 45). Three qualified judges classified as superior 19 samples in which there was not only conventional use of sentences and punctuation but also variety of sentence structure and organization of ideas. Another 42 samples were classified as good. These samples used a limited pattern of sentence structure, strayed from the basis of organization and just barely achieved an interpretation of the most obvious elements in the picture-stimulus for the writing. Classified as inferior were 88 samples of writing that were barely comprehensible. At the illiterate level were 39 subjects who resorted to pictures or drawing rather than words. In all, a total of 188 samples of writing were secured in grade three.

In grades four, five, and six a more carefully refined code and scale were developed from the index used in grade three. This refined scale had five steps and the papers were rated on a five-point scale. The results are shown in Table 14. The median rating for the high, random, and low groups for each of grades four, five, and six follows:

Median Rating for High, Random, and Low Group

	High	Random	Low
Grade Four	Average	Average	Below Average
Grade Five	Average	Average	Below Average
Grade Six	Average	Average	Below Average

An examination of the socio-economic ratings of the subjects shows that for those in each of the categories, the results on writing were as follows:

Table 14

Ratings of 1181 Written Compositions

Grades 4, 5, and 6 Combined

Total number of papers rated		1181
I.	Above Average	74
II.	Average	381
III.	Below Average ✓	470
IV.	Illiterate	197
V.	Primitive	59
	Grand Total	1181

Two people rated the papers. In cases of one point disagreement the lower category was taken; in cases of two point disagreement the intervening category was taken; in cases of more than two point disagreement, a third reader was used. The readers seldom varied widely in ratings; only 18 papers out of the 1181 were submitted to a third reader.

Socio-economic Category	Median Rating on Writing, Grades 4, 5, 6
I	Average
II	Average
III	Average
IV	Below Average
V	Below Average
VI	Below Average
VII	Below Average

Coherence through the use of subordination

Language is more than uttering whatever perceptions or thoughts rise by chance to the surface of expression. The content of expression requires organization. In terms of purpose and communicability, the speaker or writer must discriminate among all the materials of expression. Like a good stage director, he must work behind the scenes, rapidly placing related materials together, selecting or repressing, providing that all-important logical consecutiveness which enables discourse to "hang together." This implies, also, experience to avoid the pitfalls, to note and to consolidate the successes one has had. This variation in coherence stands out clearly in the transcripts of two different subjects in this research. The first child, a boy, organizes his communication by subordinating some ideas to others. The second child, also a boy, reveals no plan of presentation; except for a loose chronology, his content lacks the coherence and emphasis necessary to communicate successfully to another person. He is not fully aware of dependent clauses as a way to communicate his ideas.

Subject Y.E.

> Well, I was climbing a fence--me and another boy./ He's Chico./ He lives somewhere by us./ A boy pulled on our pants so when we got down we would fall./ So when I went to get down, well, he let go,/ and I jumped down and fell on Chico./ So the boy came around from the fence/ and he started to spit at us/ and we started to run where my daddy was./ But my daddy wasn't there./ He was in the front office,/ and so I told another man that works there./ And the boy went and got a coke and drank it and left./

Subject B.D.

> Superman, I seen him last night ... Clark Kent in Superman, do you know?/ An he, an he puts a aspirin, you know, a bad man put the aspirin in this little ... in here,/ an, an he said, and this guy, well he told him ... an he says how ... an, an, an this guy pickpocket him/ and he said, an the man said, "Is that the latest report?/ Let's see."/ An he said, "No."/ This man--see he's a bad man--and the guy he's working for--the boss--well, then he came up and he said, "Give the man some coffee./ Have some for me too."/ And then he went ahead with his money./

Although the first subject misses an opportunity to smooth his expression by subordinating his reference to Chico and the location of Chico's home, his discourse is nevertheless coherent. In organizing his material he subordinates four different elements, including one instance of double subordination. Subject B.D., on the other hand, displays little or no plan of presentation for his account of the television program. His language is cluttered with false starts, and only once does he resort to subordination as an aid to organizing his material ("the guy he's working for"). Because he doesn't decide what to feature and what to subordinate, B.D.'s talk lacks plan and order. In terms of features which can be identified and quantified, one major difference between him and Y.E. lies in the use of dependent clauses.

One difference in kinds of dependent clauses among three groups of subjects--low, high, and random subgroups--appears in Figure 6. Adverb and noun clauses are much more common than adjective clauses. In all of

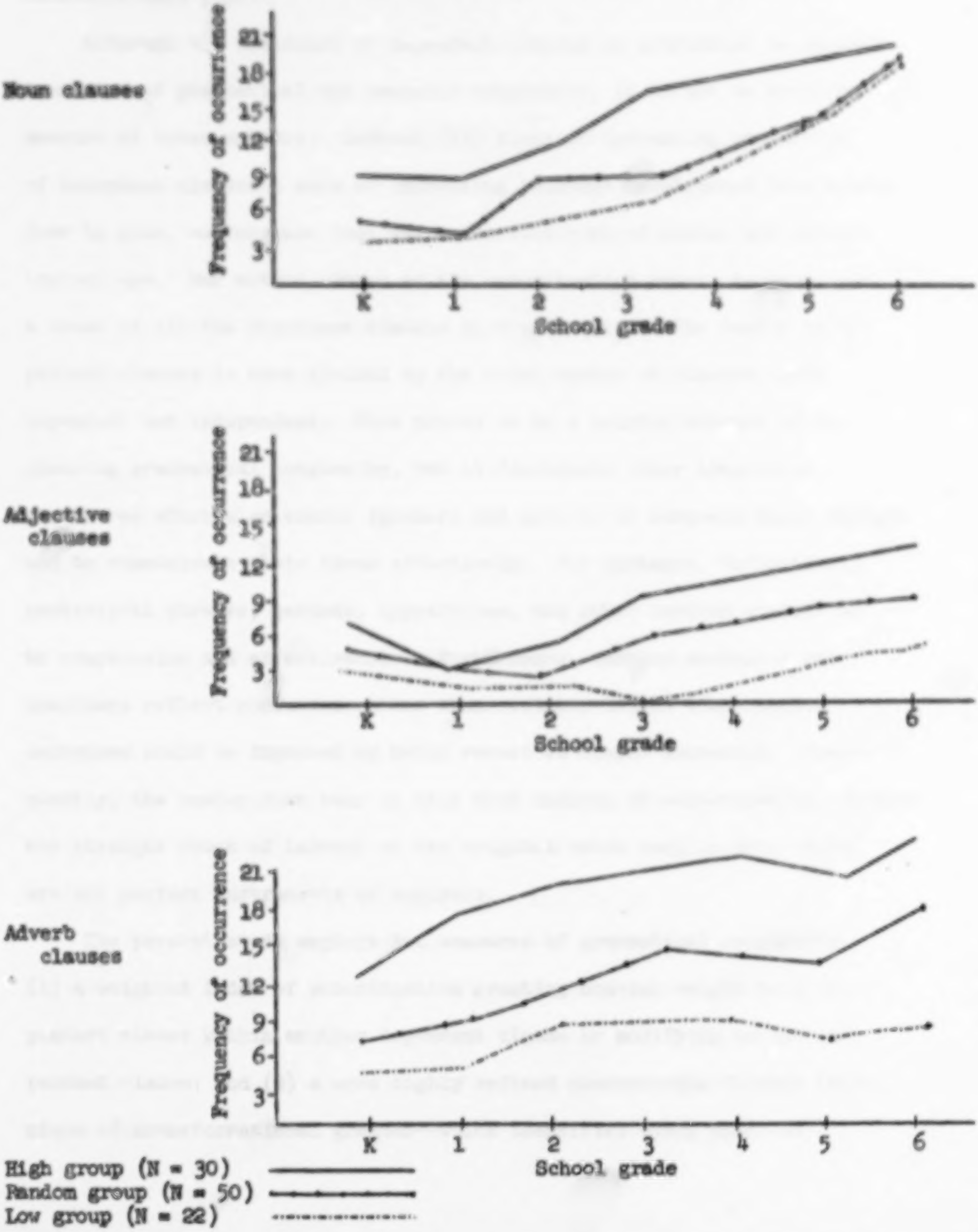


Figure 6

Incidence of Subordination: Frequency of Three Types of Subordination for Low, High and Random Subgroups of Subjects these, the high subgroup exceeds the low subgroup in incidence of use. Except for adjective clauses in grades two and three, the number of clauses increases each year.

Although the incidence of dependent clauses in expression is usually a measure of grammatical and semantic complexity, it is not an absolute measure of these matters. LaBrant (15) found an increasing proportion of dependent clauses a mark of increasing language development from grades four to nine, an increase that was a function both of mental and chronological age. Her method, known as the subordination index, depends upon a count of all the dependent clauses in a transcript. The number of dependent clauses is then divided by the total number of clauses, both dependent and independent. This proves to be a helpful measure of increasing grammatical complexity, but it disregards other linguistic structures which also enable speakers and writers to compress their thought and to communicate their ideas effectively. For instance, infinitives, participial phrases, gerunds, appositives, and other devices contribute to compression and effectiveness. Furthermore, complex sentences can sometimes reflect confusion rather than control; indeed some complex sentences could be improved by being recast as simple sentences. Consequently, the reader must bear in mind that indices of subordination, whether the straight count of LaBrant or the weighted count used in this study, are not perfect instruments of analysis.

The present study employs two measures of grammatical complexity: (1) a weighted index of subordination granting heavier weight to a dependent clause within another dependent clause or modifying another dependent clause; and (2) a more highly refined measure--the Chomsky technique of transformational grammar--which identifies every means of grammatical complexity. These two methods and their results are presented in the next few pages.

(1) The weighted index of subordination

For three subgroups--the high, low, and random--all dependent clauses were tallied as follows:

1 point for each dependent clause (first-order dependent clauses)

2 points for any dependent clause modifying or within another dependent clause (second-order dependent clauses)

2 points for any dependent clause containing a verbal construction such as an infinitive, gerund, or participal

3 points for any dependent clause within or modifying another dependent clause which, in turn, is within or modifies another dependent clause (third-order dependent clauses)

As will be seen in Table 15 the high group uses such grammatical complexity to a greater extent than the other two groups. The low group uses the least amount of grammatical complexity, although all groups show an increase in grammatical complexity as chronological age increases. In the data from which Table 15 is constructed, the boys in the low group made scores that were consistently beneath those of the girls in the low group. This was not true of the boys in the high group who were superior to the girls in kindergarten as well as grades one, three, and five.

(2) The Chomsky technique of transformational grammar

For a more complete study of grammatical complexity, this research has applied the methods of transformational grammar to the transcripts of two subjects. Transformational grammar identifies all forms of grammatical complexity, but it is a slow and lengthy process of analysis. Its criteria are primarily structural. The combination of both structural and semantic

Table 15

Subordination Index

Incidence of Subordination Weighted According to Complexity in Use of Dependent Clauses and Verbal Phrases

Year in School	High Group N = 25		Random Group N = 25		Low Group N = 24	
	Median	Adjusted Median	Median	Adjusted Median	Median	Adjusted Median
Kg	19	.026	11	.019	6	.012
1	21	.027	15	.021	8	.013
2	30	.032	21	.023	9	.016
3	34	.028	23	.025	10.5	.021
4	42	.035	30	.027	13	.018
5	44	.036	32	.029	21	.024
6	53	.033	41	.030	24.5	.022

The median is the mid-score based on the weighted index.

The adjusted median is the mid-score of each subgroup when each subject's weighted index is divided by the total number of words in the subject's transcript. This adjusted score was computed in order to avoid favoring subjects who used more language than others.

criteria, used elsewhere in this study, is abandoned at this point and the analysis is limited to two structural questions: (1) How does the subject's grammar generate grammatical and ungrammatical utterances? and (2) by inference, what kind of grammatical model is the subject using in order to manipulate his structures?

For our purposes here we will describe our grammar as a system of devices which reinforce each other in generating and controlling grammatical utterances. A "knowledge of one's grammar" will not, it must be pointed out, guarantee the consistent creation of grammatical sentences. Everyone who speaks English works from some kind of grammar, yet consciousness of the model is rare indeed, for as will be seen in the next section of this research, the child knows the structure of his language by the time he is in kindergarten. Nor does it follow that all models are of equal power of accuracy.

Our grammar may be seen as existing and operating on two contiguous levels: (1) a phrase structure grammar and (2) a transformational grammar.* The phrase structure grammar makes possible the simple, active kernel statements of our language--statements such as John eats, John eats onions, and Onions are roots. Within any kernel statement there are certain obligations and options. For example, a grammatical obligation in English is concord (or agreement) between subject and verb in active voice. An option, on the other hand, is the use of a general or specific determiner or no determiner at all. Thus,

---

* The following description of transformational analysis and application to the language of two subjects in this research has been prepared by John Dennis, Assistant Professor of Language Arts, San Francisco State College, San Francisco, California.

$$\left.\begin{matrix}\text{A}\\ \text{The}\end{matrix}\right\}\text{ boy eats }\left\{\begin{matrix}\text{the}\\ \text{a}\end{matrix}\right\}\text{ onion.}$$

If the nominal phrase (or "complete subject") is singular or plural the verbal phrase (or "complete predicate") is obliged to agree in person and number. The use of a or the is optional here. Inclusion or exclusion of modification constitutes another option in phrase structure grammar. It is possible, however, that the selection of certain types of modification may impose structural obligations.

We may think of the generation of an utterance in phrase structure grammar as a series of steps, governed by a small body of rules which tell us what order the steps should take and what options and obligations we have as we proceed. Such a model would look this way:

Step 1. $NP_{singular} + VP_{singular}$
Step 2. T N V NP
Step 3. The boy Aux. V a N
Step 4. The boy (C) like a girl
Step 5. The boy (present) like a girl
Step 6. The boy likes a girl
Step 7. Pattern of communication unit: / 1 2 4/

N = noun
V = verb
P = phrase
C = concord, tense

If we look now beyond the level of kernel structures, those simple active statements in our language such as the / 1 2 4 / communication unit just above, we observe the manipulation of those kernel structures according to options and obligations of a different sort. We note a number of specific and general transformations. At this higher level, the much more complex structures of our language can be produced by a succession of transformations. Examples of such grammatical operations beyond phrase structure grammar include passive constructions, auxiliary transforms, questions, negative constructions, emphatic constructions (using *Do* and *Did* plus primary stress), and the use of generalized conjunction transformations (the use of *and* to link sentence elements of the same type). Again there is an order which must be observed. If an active, positive statement is to be transformed into a passive, negative one, the passive transform must precede the negative one. Our earlier structure "The boy eats an onion" would be transformed through these steps:

Phrase structure: The boy eats an onion.

Transformation: (passive) An onion (past) be + en eat by the boy

Transformation: (auxiliary) An onion not be (past) eat + en by the boy

Transformation: (negative) An onion not be (past) eat + en by the boy

: An onion was not eaten by the boy.

It could be argued that there is nothing "new" about this kind of operation. Grammarians have been writing about passive constructions and the use of negatives for a long time. The coining and the use of the term transformation itself does not bring enlightenment. However, the advantage of transformation theory and classification is clear. Through a model, what was previously explained in impressionistic or imprecise terms can now be made more orderly, explicit, and economical.

In this research we have chosen samples from the speech of two children. The subjects were a boy from the high group and a girl from the low group. The three sets of utterances used for analysis here were collected from each of them during a six year interval. The stimulus used to elicit responses was a colored painting depicting a Mardi Gras scene, the third picture in the interview. In the painting people dressed for carnival are pulling an enormous clown. The same picture was used each of the three times during the six year period. The ages of the children when the three samples were taken were five, nine, and eleven, respectively. The children have been given *a priori* subjective classifications: the boy is considered an "effective" user of structure (high group); the girl, "ineffective" (low group).

In order to quantify and qualify these judgments in *objective* terms, we followed this plan:

... All of the utterances of both children were *reduced* from the transformational level to the phrase structure (kernel) level whenever sample structure under analysis made this possible. In many instances, of course, the structures were already at the phrase structure level.

... The type and number of transformations used were noted. If a transform was faultily used, the type and frequency of misuse were noted.

... The types and frequencies of transformations were tallied as evidence to support these two hypotheses:

(1) the ability to make grammatical sentences at the transformational level indicates a greater control over structure than does the consistent creation of grammatical sentences at the phrase structure level;

(2) quantity and variety of transforms will probably reinforce one another. That is, the power of the grammatical model from which the subject is working will allow not only *more* transformations, but transforms of different kinds. Grammatical control thus multiplies instead of simply adding.

Findings

1953, both subjects are age six.

1.1 The boy, Angelo, prejudged effective, produced in his first transcription fifteen kernel sentences. Nine of the fifteen kernels were produced from six transformations, one of which was faulty and therefore ungrammatical. Transform types:

... Question (1)

... Wh transform (use of the relative pronoun or "zero" relative), (1)

... Elliptical transform (use of an -ing form as a noun modifier: "There is a clown/ (He is) holding a little clown."), (3)

... Faulty conjunction transform: ("There is a clown in a white suit and black buttons and blowing a horn."), (1)

1.2 The girl, Joanne, prejudged less effective with language, produced only six responses. Three of these were syntactically incomplete, and could be called "naming" responses, but not utterances of a "minimum free" type. She produced three transforms:

... Wh transform (1)

... Negative transform (2)

1957, both subjects are age 10.

2.1 Angelo produced thirty-two kernel sentences. Of these, sixteen were produced from eight transformations of the following types:

... Elliptical (1)

... Conjunction (including causal and conditional types) (3)

... Indirect object (1)

... Negative (1)

... Comparative (as big as), (1)

... Faulty conjunction (2)

Note: Angelo combined three sentences in one complex transform; he tried to combine four kernels to make another, but two of these resulted in a faulty transform.

2.2 Joanne produced nine kernel sentences. Of these, four were produced from two (2) transforms:

... Conjunction (1)

... Faulty conjunction (1)

1959, both subjects are age 12.

3.1 Angelo produced sixteen kernel statements. All but one of them are reduced from transformations. Angelo's utterances are few in number but complex in quality. Angelo uses:

... T wh (4)

... T passive (1)

... T ellipsis (2)

... T conj. (4 sentences linked), (1)

... T conj. faulty (1)

Two, three, and four kernel sentences are combined in this sample.

3.2 Joanne has seventeen kernels and only three transforms:

... T conj. (1)

... T wh (1)

... T ind. obj. (1)

Joanne produces four ungrammatical sentences because of lack of concord between $NP_{pl.}$ and $VP_{pl.}$. She uses VP sing. (Aux.): (i.e., "They was . . .").

Summary

ANGELO

Grammatical transformations	19
Faulty transformations*	4
Total transformations:	23

* All faulty T were T conj.

Frequency and types of grammatical transformations:

T wh	5
Question	1
Negative	1
Ellipsis	6
Conjunct.	4
Ind. obj.	1
Comparative	1
Total	19

JOANNE

Grammatical transformations	7
Faulty transformations*	1
Total transformations:	8
(Nonsentences	3)
(Ungrammatical kernels	4)

* The one faulty T was T conj.

Frequency and types of grammatical transformations:

T wh	2
T negative	2
T ind. obj.	1
T conj.	2
Total	7

This transformational analysis, although carried out for only two subjects, illustrates the possibilities of a more precise method of measuring grammatical complexity. It is a tentative support of the two hypotheses, for Angelo's ability to make grammatical sentences at the transformational level shows his greater control over structure than does Joanne's persistence in creating sentences at the phrase structure level.

At the age of ten, Angelo is handling grammatical structure with a proficiency Joanne has not yet reached even at the age of twelve. The method holds, therefore, promise for future research.

Both the weighted index of subordination and the transformation analysis support the hypothesis that complexity of grammatical structure is associated not only with chronological age but also with proficiency in language. The high group uses more subordination than the low group and in particular uses more adverbial dependent clauses, second-order subordination, and subordination which includes infinitive and verbal phrases. Boys in the low group made consistently poorer scores in subordination than did girls in the low group.

Coherence through the use of subordinating connectives

The accurate use of subordinating connectives such as although, because, and unless has been shown to develop with age. Watts (34:82-4 and 302-5) devised a multiple-choice test with items such as the following:

He loves his mother, although

a) she loves him.
b) she is unkind to him.
c) she is kind.
d) he does not.

Beginning in grade five, this Watts Test of Subordinating Connectives was administered and the results are shown in Figure 7. The socio-economic status of the subjects is of interest. If the median scores and the range of scores are examined by socio-economic level, we obtain the clear trends shown in Table 16.

Figure 7

Ability to Use Subordinating Connectives

Median Scores of High, Random, and Low Groups in

Grades 5, 6, and 7

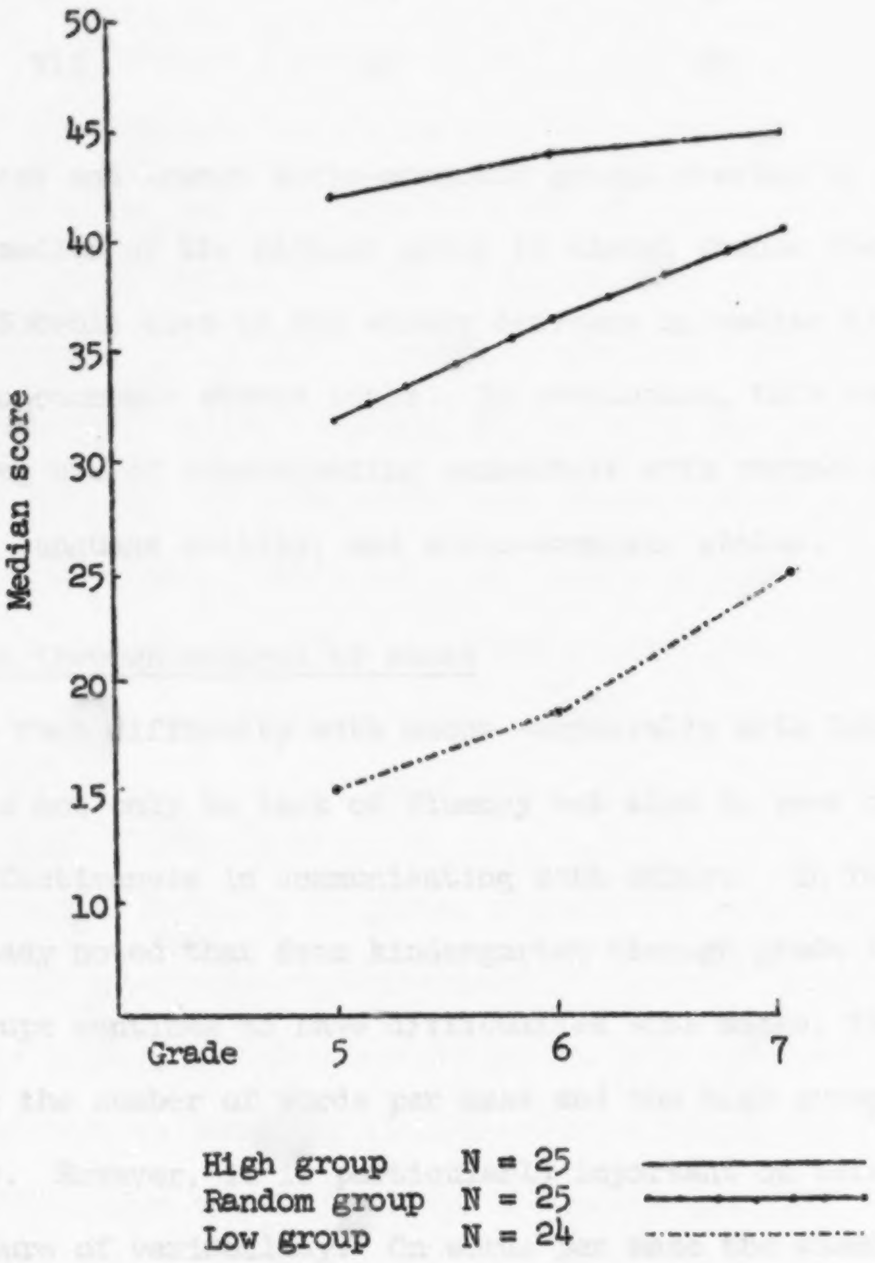


Table 16

Socio-economic Level	Number	Median	Range
I	24	43	33-46
II	43	41	24-47
III	25	39	0-48
IV	30	34	4-46
V	46	33	0-48
VI	43	30	0-41
VII	21	24	3-36

The highest and lowest socio-economic groups overlap by only a few points and the median of the highest group is almost double that of the lowest group. Notable also is the steady decrease in median as one reads down the socio-economic status scale. In conclusion, this sample shows an increasing use of subordinating connectors with chronological age, mental ability, language ability, and socio-economic status.

Coherence through control of mazes

Too much difficulty with mazes--especially with long unresolved mazes--testifies not only to lack of fluency but also to poor control over speech and ineffectiveness in communicating with others. In Table 4, the reader has already noted that from kindergarten through grade three both low and high groups continue to have difficulties with mazes, the low group increasing the number of words per maze and the high group decreasing them slightly. However, it is particularly important on this matter to note the measure of variability. On words per maze the standard deviation is decreasing for the high group and increasing for the low group.

Direct inspection of the mazes shows what is happening. Members of the high subgroup are controlling each maze, holding it down to a few words. For example, this maze from a boy in the high subgroup:

> "That looks like a funny clown [holdin' a . .] holdin' a puppet in both hands."

On the other hand, members of the low subgroup are increasing the number of words in many of their mazes:

> "[Then . then-n . you, then a boy hear you say . then-d] then they chase you."

> "[These two are .. an this one who . who has .] these are all pirates having a party."

However, this increase in variability of words per maze on the part of the low subgroup may be a promising rather than a discouraging development, for it may well be a sign of growth through striving. For the present purpose the evidence on mazes does show that subjects are not in perfect control of their speech, whether they are rated low or high in language ability. It also shows that those highest in language ability speak somewhat more effectively and control more skillfully these difficulties of expression. It is regretted that there has not been time as yet to continue the study of mazes into grades four, five, and six.

Coherence of spoken style

Among the features of spoken style which were classified (see pages 33-37), one category was coherent-to-incoherent. As Tables 17a and 17b show, the high subgroup cannot be proved more coherent than the random group but the low subgroup was less coherent than the random group. This latter difference was significant at the one per cent level.

The evidence also indicates that the subjects low in language ability follow more unconventional usage and speak less distinctly than the random

Table 17a

Effectiveness in Style of Speaking

Values of χ^2 Indicating Differences in Nine Categories for High Subgroup and an Equal Number of Subjects Drawn at Random from the Total Group

(N = 25)

Category	Actual frequency		Empirical frequency		Chi-square 2 degrees of freedom		Level of significance	
	A	B	A	B	A	B	A	B
Fluent	19	14	14	9	1.78	2.78	10	10 *
Average	6	11	10	16	1.60	1.56		
Halting	0	0	1	0	1.00	0		
Deliberate	13	13	6	8	8.16	3.10	1	5
Average	12	12	17	14	1.47	.29		
Impulsive	0	0	2	3	2.00	3.00		
Coherent	25	24	22	23	.45	.043	20	0
Average	0	1	2	1	2.00	0		
Incoherent	0	0	1	1	1.00	1.00		
Energetic	15	15	14	13	.07	.30	not significant	
Average	9	10	10	12	.10	.33		
Listless	1	0	1	0	0	0		
Laconic	2	4	3	4	.33	0	9	25
Average	22	20	17	16	1.47	1.00		
Loquacious	1	1	5	5	3.20	3.20		
Expressive	12	11	8	5	2.00	7.20	0	1
Average	13	13	17	20	.94	2.45		
Flat, expressionless	0	1	0	0	0	0		
Distinct	23	21	17	18	2.12	.50	5	0
Average	2	4	8	7	4.50	1.29		
Mumbled	0	0	0	0	0	0		
Conventional usage	25	25	13	13	11.08	11.08	1	1
Average	0	0	10	10	10.00	10.00		
Unconventional usage	0	0	2	2	2.00	2.00		
Ready response	21	21	15	18	0	.50	10	0
Average	4	4	4	7	0	1.29		
Slow response	0	0	6	0	0	0		

* See page 36 for two other judges who reach the one per cent level, using 30 high cases.

Table 17b

Effectiveness in Style of Speaking

Values of χ^2 Indicating Differences in Nine Categories for Low Subgroup and an Equal Number of Subjects Drawn at Random from the Total Group

(N = 24)

Category	Actual frequency		Empirical frequency		Chi-square 2 degrees of freedom		Level of significance (in per cent)	
	A	B	A	B	A	B	A	B
Fluent	4	4	14	9	7.14	2.78	1	25 *
Average	13	17	9	15	1.78	.27		
Halting	7	3	1	0	36.00	0		
Deliberate	3	6	6	8	1.50	.50	not significant	
Average	18	16	16	13	.25	.69		
Impulsive	3	2	2	3	.50	.33		
Coherent	14	12	21	22	2.33	4.09	1	1
Average	8	10	2	1	18.00	81.00		
Incoherent	2	2	1	1	1.00	1.00		
Energetic	9	8	13	12	1.23	1.33	not significant	
Average	13	14	10	12	.90	.33		
Listless	2	2	1	0	1.00	0		
Laconic	2	3	2	3	0	0	not significant	
Average	19	17	17	16	.24	.06		
Loquacious	3	4	5	5	.80	.20		
Expressive	4	3	7	4	1.28	.25	not significant	
Average	15	16	17	20	.24	.80		
Flat, expressionless	5	5	0	0	0	0		
Distinct	9	4	16	17	3.06	9.94	5	1
Average	12	19	8	7	2.00	20.58		
Mumbled	3	1	0	0	0	0		
Conventional usage	3	3	12	12	6.75	6.75	1	1
Average	13	17	10	10	.90	4.90		
Unconventional usage	8	4	2	2	18.00	2.00		
Ready response	10	9	16	17	2.25	3.77		
Average	10	12	8	7	.50	3.57	30	2
Slow response	4	3	0	0	0	0		

* See page 37 for two other judges who reach the one per cent level.

group. They also tend to be slower in responding to conversation. Those high in language ability are more fluent, deliberate, conventional in their usage, and possibly more distinct in their speech than the total group.

SUMMARY ON EFFECTIVENESS AND CONTROL

Effectiveness and control of language have been examined by nine types of assessment. Although the subjects did not vary greatly in their use of the basic structural patterns of English, those who were high in language ability showed much greater dexterity in varying the elements within these patterns. Their repertoires for filling in the nominal positions and the movables of English syntax were clearly more varied than those of the group low in language ability. The high group also showed a definitely greater sensitivity to and control of the conventions of standard English, used provisional and conditional statements more often, showed greater competence in writing and reading, and excelled in coherence as measured by four different forms of assessment.

INTERRELATIONSHIPS AMONG THE LANGUAGE ARTS

The extent to which interrelationships exist among the language arts is still a matter of speculation. Hildreth (12) states that evidence of such relatedness exists, but her sources prove to be studies showing a positive relation between spelling and reading only. Martin's study of the interrelationships among language variables in the first grade (21) produced contrary evidence. "There was little indication that the first grader who talked well would succeed in reading or that the poor speaker would have difficulty in it. Some children who were able to write well did poorly in both speaking and reading. Good readers were poor writers!"

In this research interrelationships have been charted for the following factors: oral with written language; oral language with reading; reading with written language; and health with general language ability. The interrelationships extend beyond the first grade and prove to be positive in the years beyond those covered in Martin's study.

Those who write well in the third grade also rank high on oral language and in reading. Table 18 arranges 188 third grade students in the study according to their ability to write. Those who are superior and above average on writing are also above average on speaking and reading. Those who are below average on any of the three measures are also below average on the other two.

Those subjects who read well by the end of grade three are the subjects who have ranked high in oral language for the kindergarten and first three years of the study. As shown in Figure 8, not a single one of the twenty best readers in grade three is below the mean on oral language. For average and poor readers, however, this relationship with oral language power is not apparent. This lack of relationship for average and poor readers could result from imprecision in the measure of reading achievement. The reading index in Figure 8 is based on teachers' records of the subjects' reading--mostly primers, basic readers, and supplementary readers at this early stage of learning reading. Teaching practice in the schools tends to keep most students at the same reading tasks, and by grade three only the exceptional readers exhibit notable individual reading patterns. This may very likely be what Figure 8 reveals. In grades four, five, and six of this study, where reading achievement is more accurately determined by standardized achievement tests and records of individual voluntary reading, the relation between reading and oral

Table 18

Subjects Classified According to Writing Ability: Average Scores on Reading and Speaking

Written language: classification of subjects in grade three	Number in group	Reading achievement: average reading index of group	Oral language: average teachers' rating of groups' oral language
I Superior group	19	25.8	3.73
II Above average group	42	23.0	3.77
III Below average group	88	18.5	3.27
IV Illiterate group	39	9.7	2.92
Total group	188	19.2	3.42

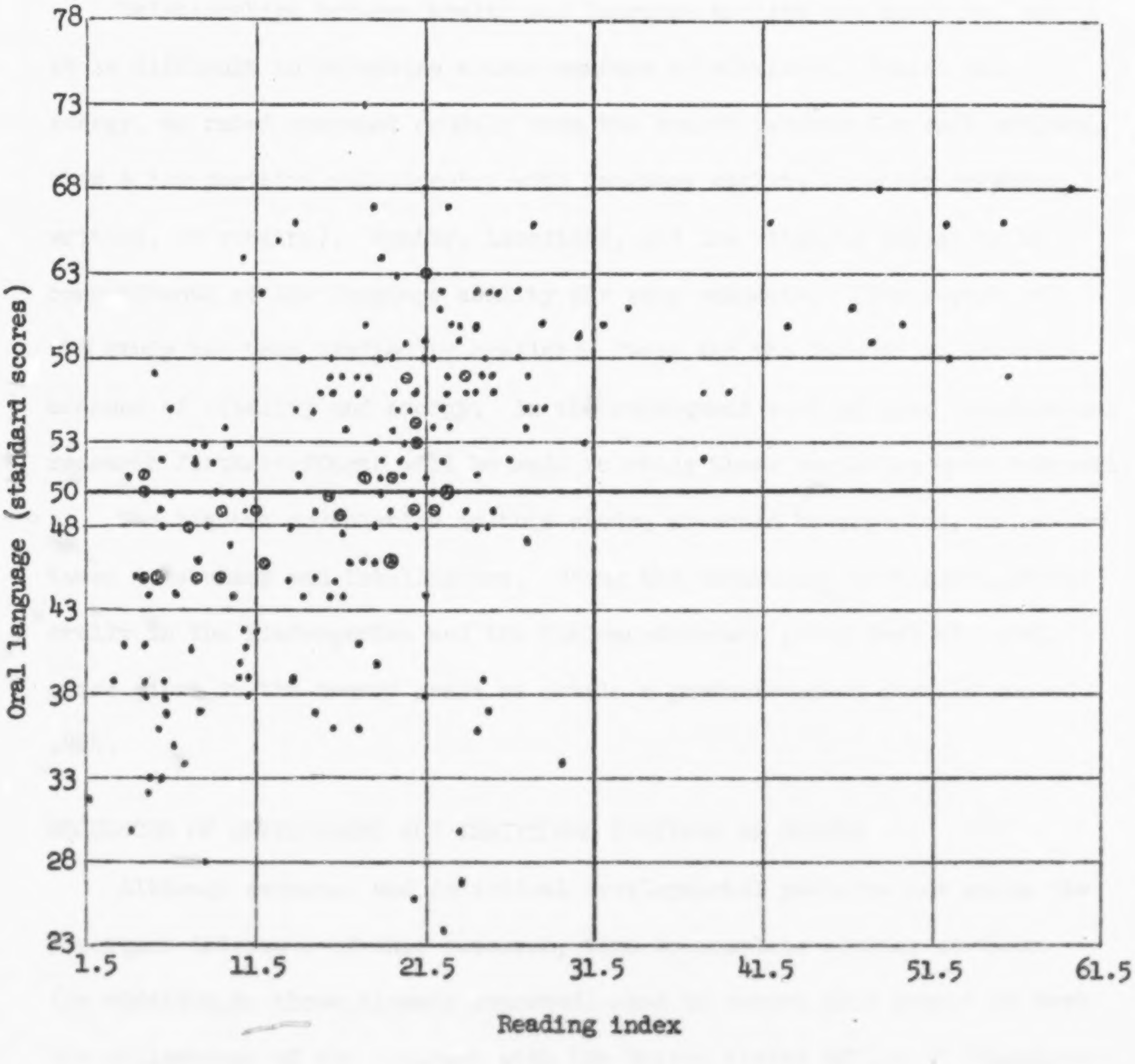
Figure 8

Relationship between Oral Language and Reading

Grade 3

Scattergram of oral language scores and reading index

N = 230



language may be more clearly shown for all subjects. As the subjects grow older, the spread of their reading ability will also become greater. (See Figure 5 for evidence of this.) This will make possible a more precise study of the relationship between reading and other language variables. Table 19 and Figures 9, 10, 11, and 12 show that the subjects in the lowest and highest quartiles in writing also are lower and higher in reading achievement.

Relationships between health and language ability are positive, but it is difficult to determine a true measure of vitality. Health and energy, as rated somewhat crudely from the health records for each subject, show a low positive relationship with language ability (whether speaking, writing, or reading). Apathy, lassitude, and low vitality appear to be concomitants of low language ability for some subjects. This aspect of the study has been limited by available funds and the lack of an accurate measure of vitality and energy. In the subsequent work of this longitudinal research further efforts will be made to study these variables more intensely.

The highest correlation in this study, as could be expected, is between vocabulary and intelligence. Using the vocabulary test administered orally in the kindergarten and the Kuhlman-Anderson group test of intelligence given in the second grade we obtain a product-moment correlation of .844.

SEQUENCES OF DEVELOPMENT AND INDIVIDUAL PATTERNS OF GROWTH

Although sequence and individual developmental patterns are among the important interests of this research, time to complete studies of these (in addition to those already reported)--and to return this report to meet the obligations of the contract with the United States Office of Education--has not been available. However, the data for studies of this nature are

Table 19

Relation between Reading and Writing
Percentage of Readers in Each Quartile Achieving
High, Average, and Low Writing Scores

Average Reading Achievement Ages
(1956, fourth grade tests)

	Writing Scores				
	I	II	III	IV	$N_{\bar{x}_{RA}}$
Q_1 f	0	5	16	19	40
% of Q_1	0	13	40	48	
Q_2 f	6	16	15	3	40
% of Q_2	15	40	38	8	
Q_3 f	10	19	6	4	39
% of Q_3	26	49	15	1	
Q_4 f	17	12	7	3	39
% of Q_4	44	31	18	8	
N_{ws}	33	52	44	29	158

		Reading Age in 1956, chronological age 9 to 9 years, 6 months		
		years-months		years-months
$\bar{x}_{RA}$:	Q_1	6 - 4	to	8 - 3
	Q_2	8 - 4	to	9 - 4
	Q_3	9 - 5	to	10 - 5
	Q_4	10 - 6	to	13 - 3

$\bar{x}_{RA}$ = average reading achievement age on Stanford Achievement Test (average of paragraph and word meaning ages) expressed in years and months

ws = writing score

Q = quartile
    Q_1 = lowest quartile
    Q_4 = highest quartile

Figure 9

Relation between Reading and Writing

Average Reading Achievement Ages

Quartile One (N = 40)

6 years 4 months to 8 years 3 months

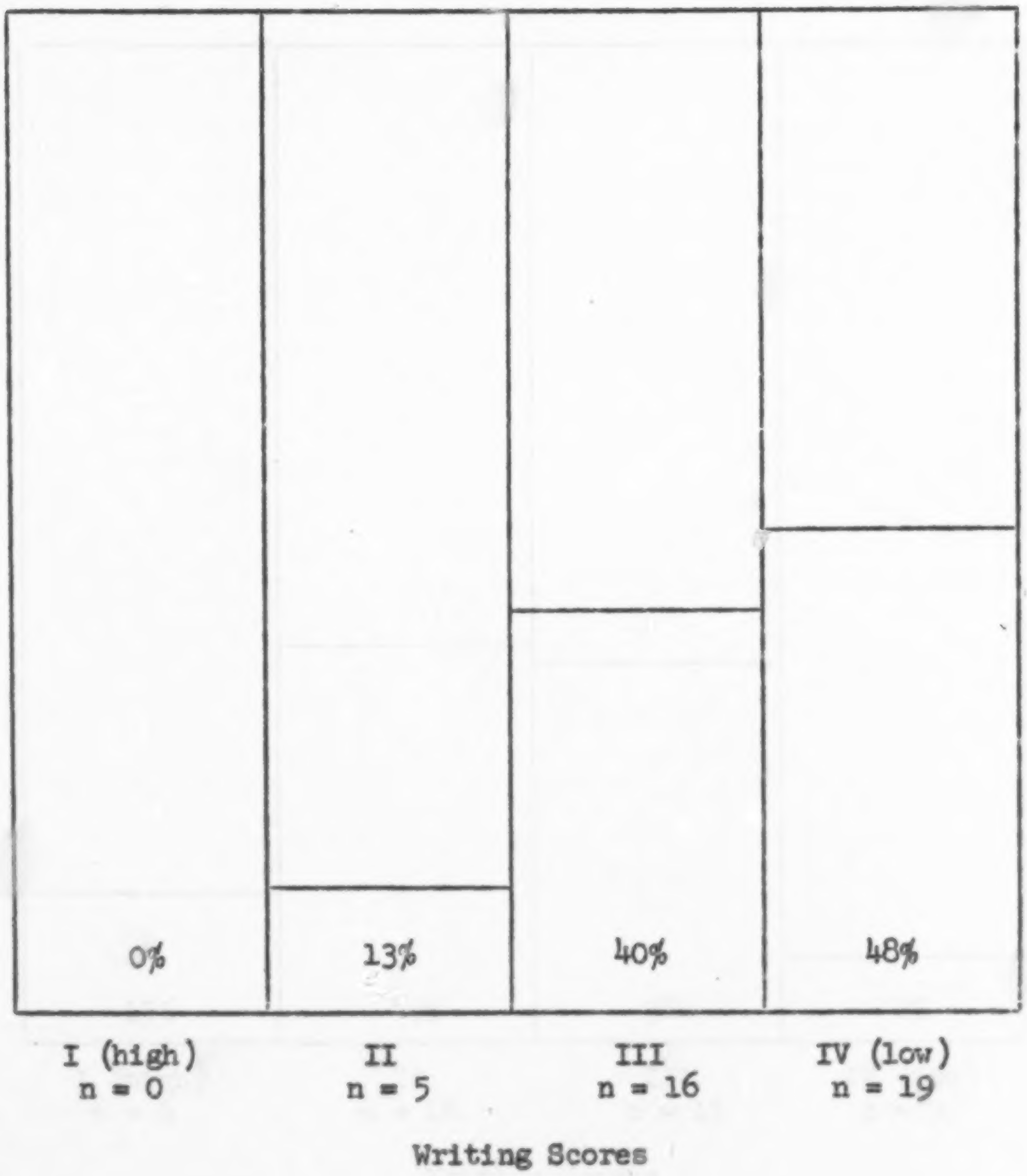


Figure 10

Relation between Reading and Writing

Average Reading Achievement Ages

Quartile Two (N = 40)

8 years 4 months to 9 years 4 months

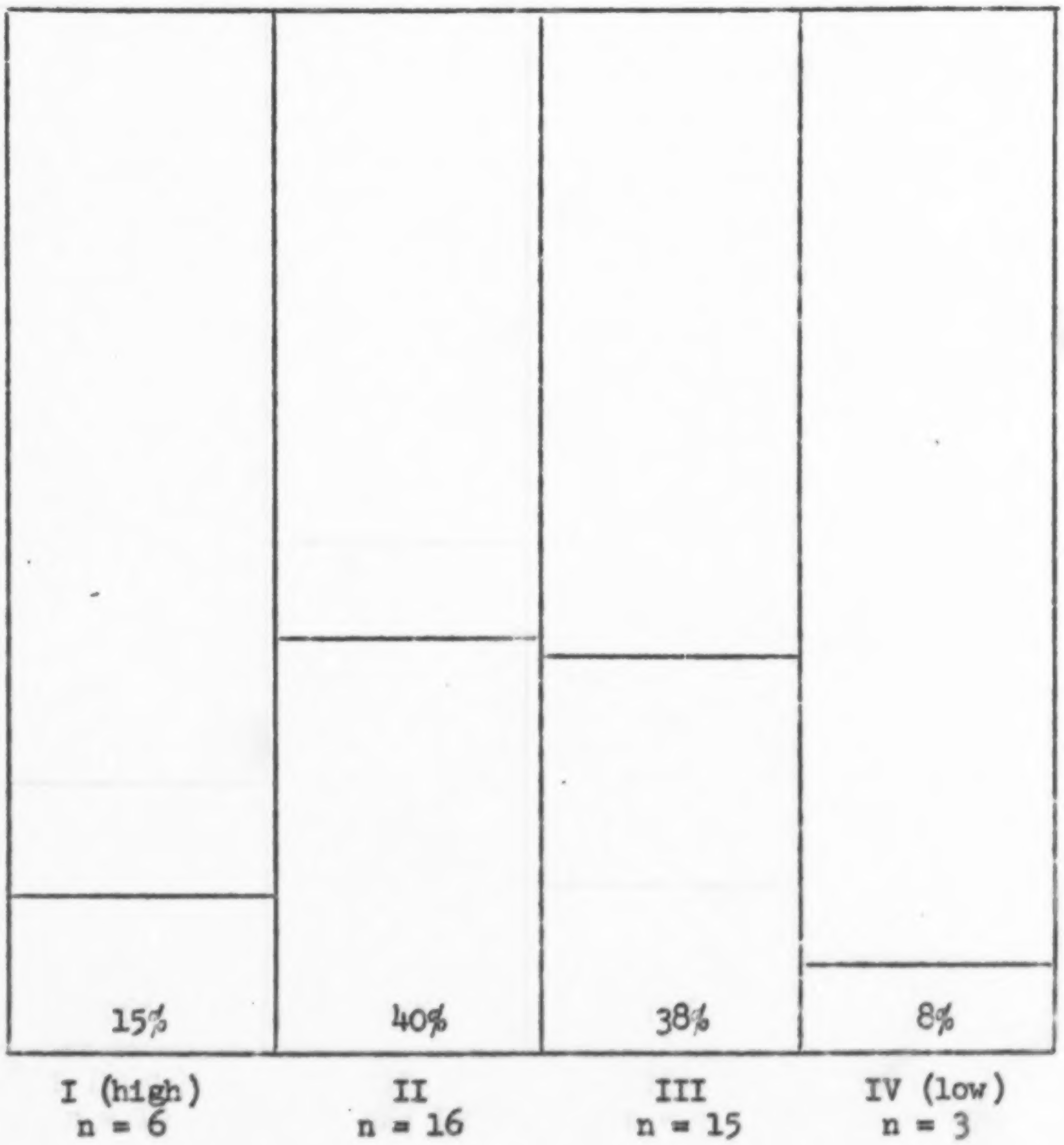


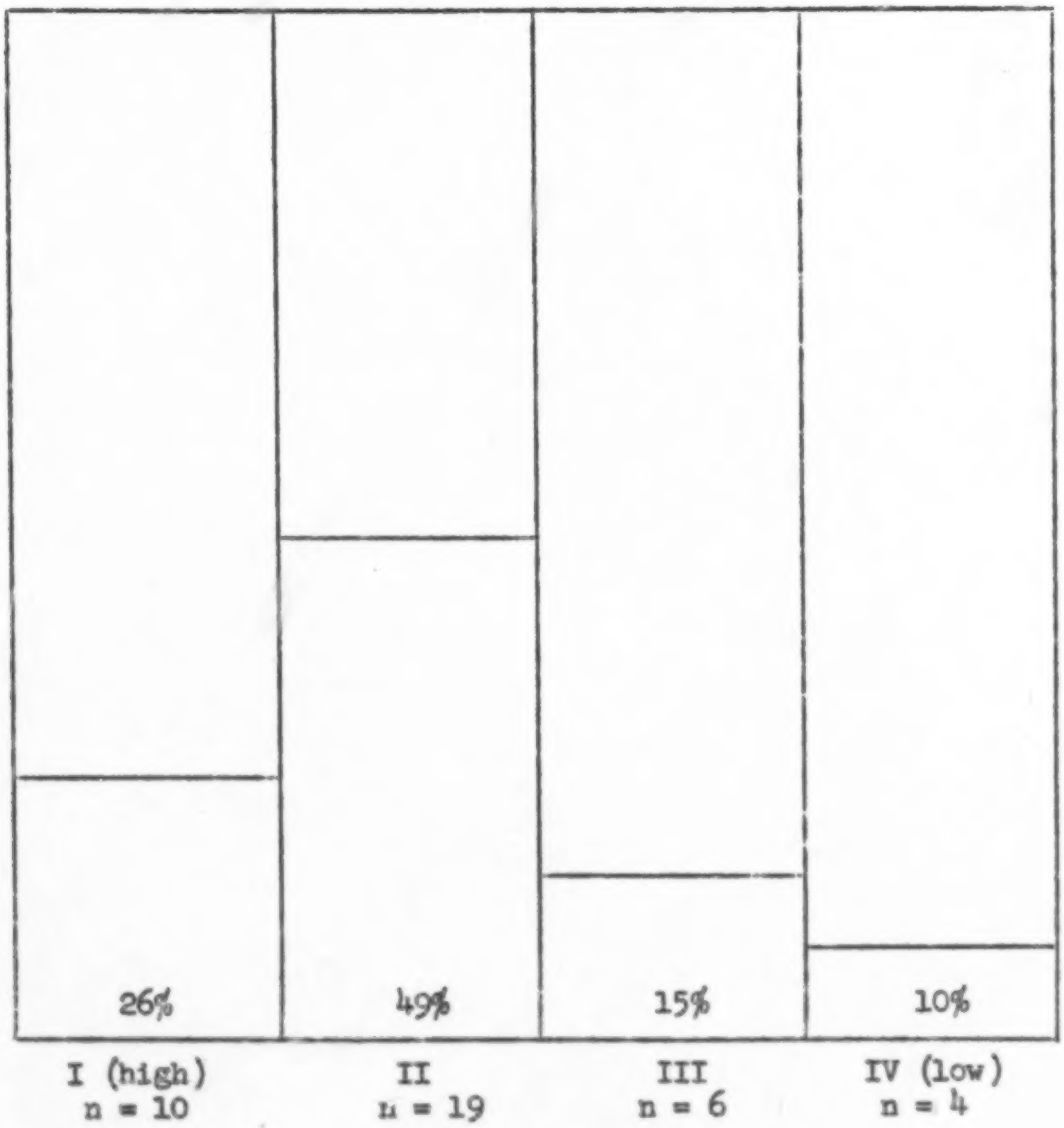
Figure 11

Relation between Reading and Writing

Average Reading Achievement Ages

Quartile Three (N = 39)

9 years 5 months to 10 years 5 months



Writing Scores

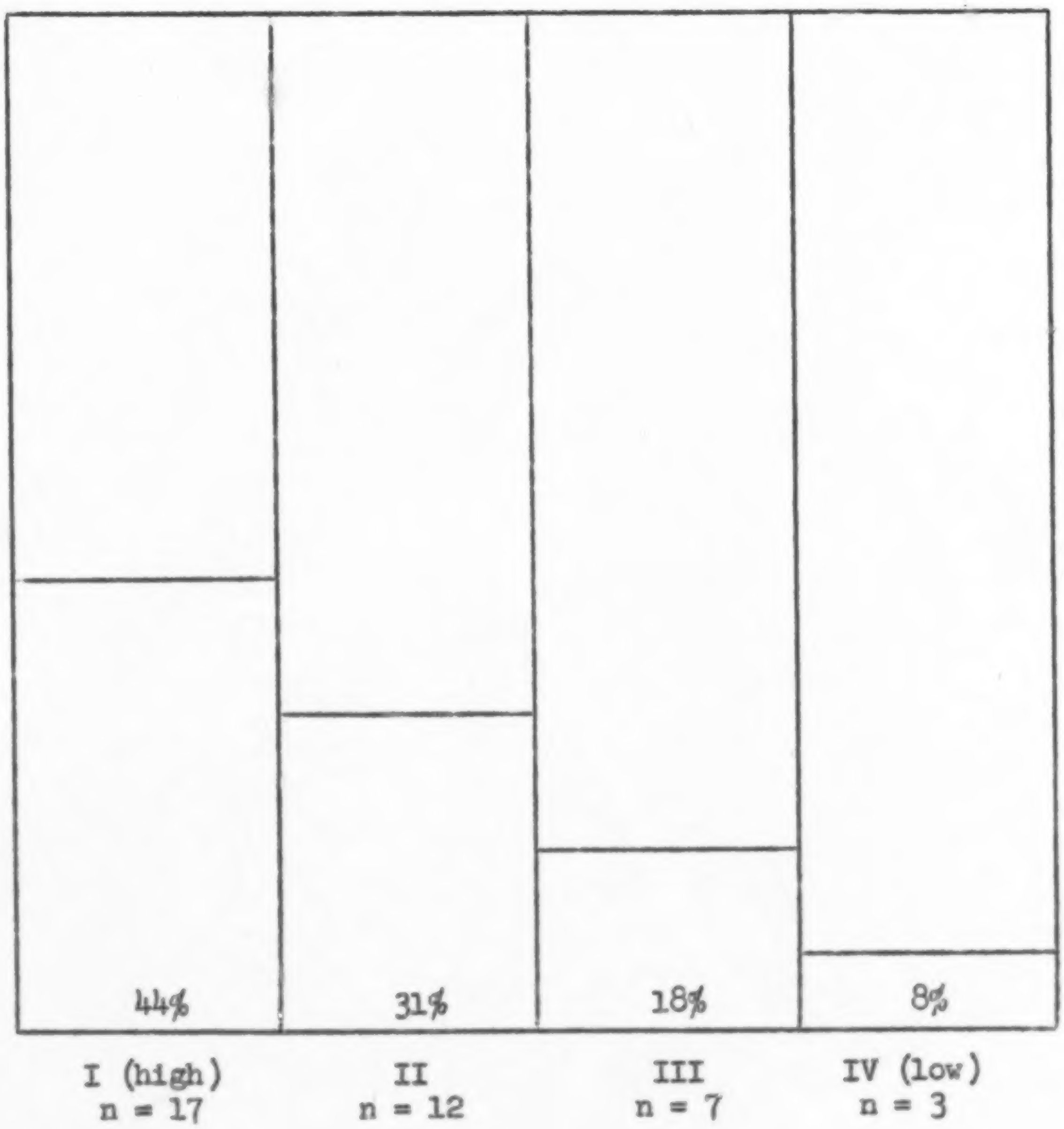
Figure 12

Relation between Reading and Writing

Average Reading Achievement Ages

Quartile Four (N = 39)

10 years 6 months to 13 years 3 months



collected and such studies will be made. Such evidence as the use of subordination, subordinating connectors, the first and second level analyses, the mazes, and the Chomsky transformational method of studying patterns all present ways to study sequences of development and individual patterns of growth.

One evidence of developmental stages may be found in the increase of certain structural patterns such as the 1②5 and in the decrease of partial structures. Wherever the low group shows a similar performance but executes its growth or levels off one or two years later than the high group, we will have the possibility of studying sequential stages of language development.

Inspection of the adverbial clauses of the low and high groups shows that in grade three, members of the high group are beginning to use relational words such as *in spite of*, *unless*, *although*, and *even if*. Before grade three examples of these words rarely appear in any of the transcripts, and they do not, even then, appear in the transcripts of the low subgroup.

In grades four through six further evidence of developmental stages appears to be taking shape. As shown in the Second Level Analysis, the members of the high group are now increasing their flexibility of sentence structure. If, within the next few years, this should begin to happen to the group least able in language ability, another stage of linguistic growth will have been demonstrated.

VALIDITY AND RELIABILITY OF FINDINGS

Four types of validity information characterize measures in research, and all four types are applicable to some of the measures in this research. *Content validity*, for instance, is involved in the Kindergarten Vocabulary

Test. How well would the subjects perform in a given universe of situations of which the vocabulary test items constitute only 100 samples? Is the content of the test a valid representation of the larger universe? Predictive validity is present in the judgments on linguistic style. Does a subject who is judged fluent and coherent in the kindergarten receive a similar judgment in the first grade--or the third grade? Concurrent validity applies to discrimination between presently identifiable groups. Does the measure on tentativeness of statement, for instance, really classify two groups of subjects differing in language ability? Lastly, construct validity is particularly important in this study, for on measures like those of writing, reading, amount of language, or extent of generalization, the investigation searches for the degree to which individuals possess such traits or qualities. The traits underlying the measures must be what is actually measured.

Validity and reliability of the measures used in this study have been discussed in Chapter Two. The present examination of the validity of the findings requires a fusion of empirical and logical evidence, and reinforcing agreement between judges is one means of drawing together these two types of evidence. The fact that different judges, operating in different areas of the study, come to an agreement is important. Subjects judged fluent, coherent, and ready to respond by one set of judges prove to be located in the group of subjects judged high in language ability by teachers' judgments and by a vocabulary test. Children with poor health records appear among the group low in voice energy as judged by those who listened to the recordings. Subjects ranking high on the vocabulary test also rank high on the four years of teachers' ratings, one item of which was a rating on vocabulary. They also rank high on the Kuhlman-Anderson

3

Test of Verbal Intelligence. Subjects with many language mazes prove to be the subjects rated low on fluency by judges of the recordings. Subjects high on coherence also measure high when scored by other judges who studied only the use of subordination.

In other research, appropriateness of English usage depends to a large extent on socio-economic level. Examination of the data in this study shows the same results. For instance, Table 17b shows that the low subgroup uses significantly more inappropriate usage than the total group, whereas Table 17a shows that the high subgroup uses significantly more appropriate usage than the total group. If we examine the socio-economic rating of the low and high groups, we find that more of the high group have higher ratings than the low group. The median for the high group on socio-economic status is IV, and for the low group, VI. A direct examination of the transcripts of the individuals in the low and high groups undergirds this kind of verification, for the members of the high group who rate among the less privileged in parental occupation are primarily those who account for the incidence of inappropriate usage in the frequencies listed in Table 12.

All measures taken from one year to the next show the two subgroups remaining in the same relative position with regard to language. Except for two subjects (in the low group) who show advances on the measures administered to them in grades four through six, the individuals in the subgroups remain notably stable in their relative position to the rest of the subjects outside their group. As one measure of stability, correlations were computed for the subjects who remained in the study throughout grades one and six. Using the teachers' ratings on the subjects' oral language ability we find positive correlations, indicating some degree of stability in language performance as gauged by teachers who are in daily contact with children. Not quite so notable, but also positive, are the correlations from year to year of the subjects' average number of words per communication unit. Here again is evidence of stability from year to year, indicating a phenomenon of language that is not quixotic or immeasurable. The correlations for these measures are shown in Table 5, page 58.

If one examines any phase of this study of language development, he finds logical and statistical evidence in frequent agreement. For instance, the high, low, and random groups maintain their expected positions on a number of different studies. See, for instance, Table 15 for subordination and Figure 7 for subordinating connectors, items on which one would logically expect a group good in language to show up well. Similar mutual reinforcement between statistical and logical evidence can be applied to the data on mazes, writing, reading, and flexibility of sentence pattern.

As the subjects have advanced in the schools, they have begun to spread out geographically. In many cases, the most convenient methods of securing such data as writing ability in a class, where only a few of the members are subjects in this study, has been to collect the data from the entire class. Such evidence, added to the total school system records on intelligence, reading, and attendance, verifies the assumption that the subjects in this study are a representative sample of the larger population from which they have been drawn.

As a validation check on the results of Tables 8a and 8b, a separate set of workers, following the same code for structure analysis, processed the transcripts for the high and low groups for kindergarten through grade six and located the number of times each pattern was used in the last 30 communication units for each subject. These were then converted, for each subject, to per cent of total number of patterns used. The medians for the high and low groups were then compared with those in Tables 8a and 8b. Once again, the only notable difference in use of patterns proved to be in the 1 ② 5 pattern (high group, 18%, low group, 13%) and in the partials (high group, 15%, low group, 24%). Thus the findings of Tables 8a and 8b are double checked for accuracy and appear to be a reliable picture of truth on the matter of structural pattern.

IV. CONCLUSIONS

This study has collected and analyzed language used by the same children in their kindergarten and first six years of elementary school. In the kindergarten year there were 338 subjects and in grade six there are still 241 subjects. One purpose of the research has been to develop methods of analysis which would make possible the scientific study of language in both its semantic and structural aspects. In this first phase of the study, the most important achievement has been the establishment of these objective methods for analysis. By combining the concept of a semantic syntactic unit with phonological methods of segmentation, and by identifying and dealing with the noncommunicative elements, the mazes, a new and useful method of language analysis has been shaped. (See pages 21-26.) This method has proved to be a grid against which a wide range of important language phenomena can be silhouetted and measured. With the unit-and-maze grid, it becomes possible to quantify and relate to a solid base line such diverse and significant aspects of language as the following:

flexibility of sentence pattern and of elements within the sentence pattern
proportion of organization and rambling
variations from conventional usage, grammar, and syntax
degree of coherence through subordination
diversity and range of vocabulary
extent to which generalizations occur
use of figurative language; metaphor, simile, irony, hyperbole, personification
freedom from language tangles or false starts (mazes)
amount of language and length of units of communication
number of separate concepts presented
amount of concreteness and abstractness
use of affective verbs and other emotional language

These are only a few of the possible features to be analyzed by this method; their significance lies in the fact that they represent some of the elements certain to enter into any study of the development of language proficiency. Furthermore, the technique applies to oral or written language equally well, though mazes are less likely to make their appearance in the written form.

By adding to the basic unit of meaning the concept of the maze, a method has evolved which makes it possible to stabilize a phenomenon as nebulous and fluctuating as human symbolic language. No basis of measurement in language can--or should--ever be as absolute as meters or inches in the exact sciences. Nevertheless, the results of analyzing communication units and mazes are open to independent verification, permitting scientists working separately to reach the same conclusions. Checks on the method prove that two or more workers following the same set of coded directions get the same results within a very close range of minor differences.

SUMMARY OF FINDINGS

Fluency with Language

1. During the first four years of schooling, the subjects speak more words each succeeding year. They also increase the number of communication units and the average number of words spoken in each of those communication units. The high subgroup uses more words and units than does the low subgroup (page 53).
2. During the first four years of schooling the subjects decrease the number of mazes and words in mazes, but the average number of words in mazes increases for the low subgroup. Those who are rated as skillful in language are reducing both their incidence of mazes and the number of words per maze. In other words, the lower group says less than the high group and many of them have more difficulty in saying it (pages 53 and 55).

3. At the kindergarten level, subjects proficient in language score 67 on a vocabulary test of 100 items and the subjects low in language score 35 (page 61). Vocabulary and proficiency in language appear to be related.
4. Both the low and high groups of subjects use the same number of words from among the 12,000 most commonly used words in the English language; after that, the low group shows a higher incidence of words selected from the next 20,000 of the most commonly used words in the language (from 13,000 to 33,000). Thereafter, the high group gains ascendancy in the use of the least commonly used words of the English language (page 64 and Figure 3 on page 65).
5. As measured by spoken style of language, the high group is significantly more fluent than a random group selected from the total sample, but their readiness of response does not differ from the random sample. The low group is less fluent than the random group and there is evidence that they may be somewhat slower to respond in oral talk (page 70).

Effectiveness and Control

Structural patterns

1. The low group uses many more partial expressions--sentence patterns that are incomplete--than the high group.
2. The group proficient in language employs the linking verb sentence pattern to a greater extent than does the low group.
3. The expletive type of sentence pattern is seldom used by the low group; for the high group, the use of it first increases, then decreases.
4. The outer complement pattern is used only by the most able of the high group, and the inner complement pattern (indirect object) is seldom used by either group.

5. Except for the linking verb pattern and the use of partials, the differences in structural patterns used by the two groups tend to be small. This similarity in use of patterns is considered to be an important finding of this study, especially when considered in relation to the findings which immediately follow.

Elements within the structural patterns

6. Although differences in structural patterns are not notable--with the exception of partials and linking verbs--very important differences do show up in the dexterity with which subjects use elements within these structures. The nominals, whether in subject or object position, and the movable elements show marked differences when low and high groups are compared. This holds true consistently for any syntactical structure more complex than a single word. It is assumed, from this, that predication, when it is studied, will also show similar marked differences. This finding on the elements of structural patterns is considered to be one of the important findings of this study and should be considered in relation to the findings (above) on the similarity of structural patterns. Not pattern but what is done to achieve flexibility within the pattern proves to be a measure of effectiveness and control of language at this level of language development.
7. In the movable elements of the patterns, the high group consistently shows a greater repertoire of clauses and multiples (movables within movables).
8. For subject nominals, the low group depends almost exclusively on nouns and pronouns.
9. For nominals used as complements, both groups use nouns and pronouns with the same frequency, but the high group invariably exceeds the low group in the use of infinitives and clauses.

10. Boys in the low group are clearly more limited in their repertoire of syntax than girls in the low group, whereas boys in the high group tend to excel the girls in the high group.

Conventional usage and grammar

11. Problems with verbs prove to be the most frequent kind of deviation from conventional usage in the primary years.
12. Lack of agreement between subject and predicate proves to be the major difficulty in the use of verbs. The trends in this study show that the difficulty increases for Negro boys in grades one through three and decreases for Negro girls, provided that these Negro children came from homes using a southern Negro dialect.
13. For Negro subjects with southern background, using the verb to be appropriately proves to be twelve times as troublesome as for northern Caucasian subjects.
14. Subjects who are rated as most proficient in language are also those who manifest the most sensitivity to the conventions of language. The subject who, despite unconventional usage, exhibits verbal linguistic skill is the exception.

Tentative thinking through the use of provisional and conditional statements

15. Those subjects most proficient with language are the ones who most frequently use language to express tentativeness. Supposition, hypothesis, and conditional statements occur much less frequently in the spoken language of those lacking skill in language.
16. Very few examples of figurative language or of generalizations occur in the oral transcripts of the subjects' language.

Reading and writing

17. Those who are high in general language ability are also high in reading. On the other hand, those who are low may be either high

or low in reading. By grade six, the low group has a median in reading achievement that is exactly at age-grade expectancy, but the lowest quartile of this group--mostly boys--has not shown any progress.

18. Writing ability is related to socio-economic position. Those who were in the four lowest socio-economic categories rated below average in writing and those who were in the highest three categories rated average in writing.

Coherence through the use of subordination

19. Adverb and noun clauses are used by the total group much more frequently than noun clauses.
20. On an index of subordination, the high group uses grammatical complexity to a greater extent than the random and low groups. This is consistent throughout all seven years of the study.
21. All groups show a use of subordination that increases as chronological age increases.
22. The boys in the low group use consistently less subordination than the girls in the low group. On the other hand, the boys in the high group were higher than the girls in four out of the seven years of the study.
23. The Chomsky technique of transformational grammar, applied to two subjects, indicates that this technique is a valuable method of studying grammatical complexity. The girl from the low group was shown to be at least two years behind the development of grammatical complexity exhibited by the boy from the high group.
24. Both the index of subordination and transformational analysis show complexity of grammatical structure to be associated not only with chronological age but also with proficiency in language.

Coherence through the use of subordinating connectives

25. There is an increasing use of subordinating connectors, increasing with chronological age, mental ability, language ability, and socio-economic status.

Coherence through control of mazes

26. From kindergarten through grade three, both low and high groups in language proficiency continue to have difficulties with language tangles, or mazes as they are called in this research. On number of words per maze the standard deviation is decreasing for the high group and increasing for the low group. Apparently all of the high group members are gaining control of mazes, whereas the members of the low group are varying more in controlling these tangles.

Coherence of spoken style

27. The high group seems not to be more coherent in spoken style than the random group, but the low group is less coherent than the random group. The statistical evidence on this is not free from the possibility of error (some cells in the chi-square method contained fewer than six cases).

Interrelationships among the language arts

28. In this study, reading, writing, and oral language show a positive relationship.

29. The subjects in the lowest and highest quartiles in writing are also lower or higher in reading achievement. Those who write well in grade three are also those who are above average in speaking and reading. Those who are below average on any of the three measures at any grade level are also below average on the other two. Those who rate in the highest group in oral proficiency are also those who

are completely above the median in reading for the random and low groups (also selected by a criterion of oral proficiency).

30. The highest correlation in the study is between vocabulary and intelligence as measured by the Kuhlman-Anderson group test of intelligence. The product-moment correlation is .844. Vocabulary, success with group tests of intelligence, and proficiency with language constitute a cluster of traits.

31. There is a low positive relation between health and language proficiency. The measure of health used is a crude measure and the relation may well be higher.

FOOTNOTES

[1] A summary of research on behavior in animals in relation to language may be found in Roger Brown, Words and Things (Glencoe, Illinois: The Free Press, 1958), Chapter V, "The Comparative Psychology of Linguistic Reference," pp. 155-193.

[1a] Ernst Cassirer and W. Von Humboldt. See Ernst Cassirer, Essay on Man (Garden City, N. Y.: Doubleday and Co., 1953), pp. 156-7.

[2] Cassirer, op. cit., p. 157.

[3] Exceptions to this are the nonverbal problems solved by such people as artists, carpenters, ballet dancers, automobile drivers, and children, all of whom frequently depend upon direct visual or kinesthetic perception and through this dependence act wisely or appropriately without verbalization.

[3a] Dorothea McCarthy, "Child Development: Language," in Walter S. Monroe, ed., Encyclopedia of Educational Research (Rev. ed.; New York: Macmillan Co., 1950), p. 170.

[4] The total longitudinal study has been planned for a period to include the subjects' school years from kindergarten through grade twelve. This monograph reports only the first seven years--the elementary years--of this total time period, 1952-1965.

[5] The basis of selection was the vocabulary test given in the kindergarten year and the average of four years of teachers' ratings of the subjects' language ability. These two scores were given equal weight in determining the subgroups.

[6] As a precaution against a decrease in the number of subjects, arrangements were made in 1955-56 with the public schools of Berkeley, an adjoining city, to record and study the language of 43 third graders the same age as the Oakland subjects. The samples of the oral and written language of the Berkeley subjects and other useful data about them have been filed without analysis and will continue to be filed each year at the same time as the identical sampling of the Oakland subjects takes place. If numbers grow too small in the Oakland group, individuals from among the Berkeley subjects can be added to the study.

[7] For these subjects the median score is V, one step below the median of the Minnesota Occupational Scale. A complete discussion of the subjects' socio-economic classification and of the Minnesota Occupational Scale will be found on pages 000-000 of this monograph.

[8] Audographs do not reproduce the quality of voice as perfectly as do tape recorders, but the quality is certainly not inferior. The main advantage of the Audograph lies in the inexpensiveness of the records, and the ease with which the records can be filed. The research reported in this article is one part of a long-term longitudinal study of the language development of these subjects. Beginning with the second year of this research (the first grade), tape recordings as well as Audograph records were made for selected children whose linguistic behavior in the kindergarten year had proved to be particularly interesting or exceptional.

[9] The Standard Interview for Individuals is printed in Appendix C, available from the writer.

[10] These directions are available from the writer.

[11] This choice of segmentation is the outcome of a conference, sponsored by the U.S. Department of Health, Education, and Welfare, and held at

Bloomington, Indiana, in October of 1959. The linguistic consultants at this conference were W. Nelson Francis, John Carroll, Harold Whitehall, Fred Householder and David Reed. The conference established a conformity of method for the research being reported in this monograph and for that of Dr. Ruth Strickland, whose similar research into the language of children will be published.

[12] These terms and a more complete discussion of them may be found on page 157 of The Structure of American English by W. Nelson Francis, New York: Ronald Press, 1958.

[13] This is what A. F. Watts calls "the natural linguistic unit." See A. F. Watts, The Language and Mental Development of Children (New York: D. C. Heath and Company, 1948), pp. 65-6.

[14] This formula was devised for the research of both Strickland, op. cit., and Loban at the Bloomington conference previously mentioned.

[15] Analysis of the functions of language requires explicit statement of the rules for classification and the boundaries for each category. Such guide lines are necessary if the analyst is to make consistent judgments and if the judgments are to be repeatable by others. In Appendix A, the reader will find the rules formulated for this analysis of the functions performed by children's language. In accordance with this statement of rules, three analysts made separate tallies for all subjects in the two groups (those highest and lowest in language skill).

[16] A subordinate clause which modified an independent element of the communication unit is termed "first-order subordination." Subordination which modified still another subordinate element, which in turn modifies an independent element, is called "second-order subordination." Second-

order subordination, as well as all subordination, has been established in research as the mark of mature mental activity and complex expression. (See LaBrant, item 15 in bibliography.) Some subjects in the present research even use third-order subordination.

[17] Naom Chomsky, review of B. F. Skinner, "Verbal Behavior," in Language, vol. 35, pp. 26-58 (1959).

__________, Syntactic Structures ('s-Gravenhage: Mouton and Company, 1957).

__________, "A Transformational Approach to Syntax," paper read at the Texas Conference on English Syntax, 1958. (To be published by A. A. Hill, in proceedings of that conference.)

Robert B. Lees, review of Syntactic Structures with further bibliography, in Language, vol. 33, pp. 375-408 (1957).

[18] The writing of the subjects has been collected each year but time and funds for an analysis of errors in writing have not been available.

[19] Both scores were transferred to standard scores and then the two scores were averaged.

[20] Herbert S. Lewin in Human Relations, vol. I, No. 2, 1947, p. 206 ff.

[21] See Dorothea McCarthy, "Child Development: Language," in Walter S. Monroe, ed., Encyclopedia of Educational Research (Rev. ed.; New York: Macmillan Company, 1950), p. 170.

[22] The lowest figure, 180, may seem exceptional but this was a child who knew more Chinese than English.

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